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THE MICRO USER

Volume 1
Number 11
January 1984
£1

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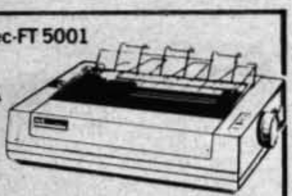

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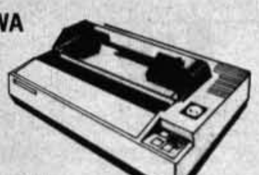

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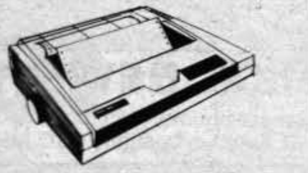

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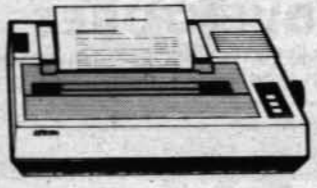

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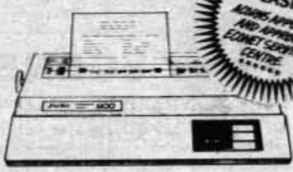

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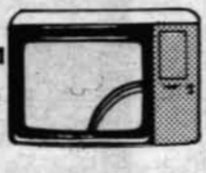

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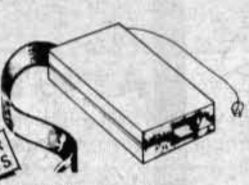

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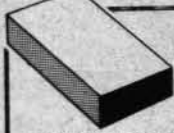

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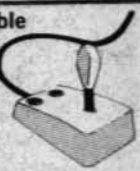

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Tel. 099 421 515. BBC Hobbit £135.00 + £3.00 p&p. BBC Second drive £120.00 + £3.00 p&p. Zero Memory Option £25.00 (£18.00 if ordered with the Hobbit). Power Supply £12.00. Manual (ordered separately) £1.50 (No VAT; refundable on purchase of Hobbit). Nascom Hobbit (unboxed) £120.00. Nascom second drive £94.00. Basic Upgrade Kit £10.00. Box of 6 cassettes £17.50. Cleaning cassette £3.50. Please add VAT at the current rate to the above prices.
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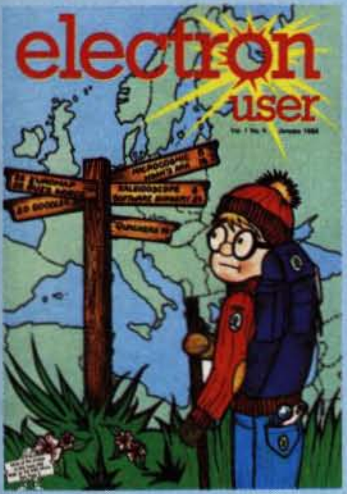
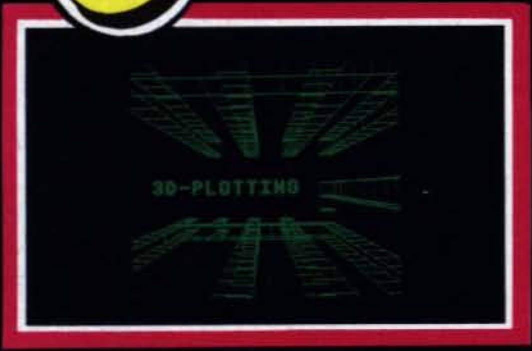
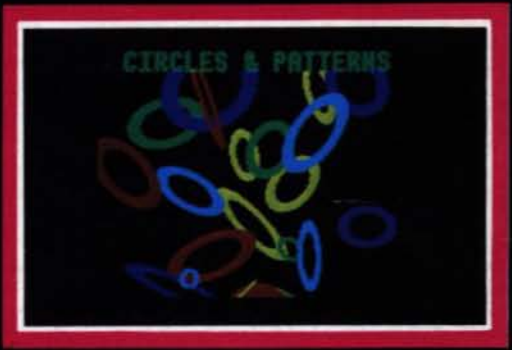


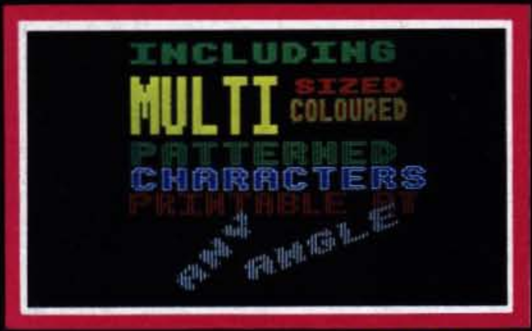
Twelve exciting programs in this, the final issue of ELECTRON USER before it goes solo!

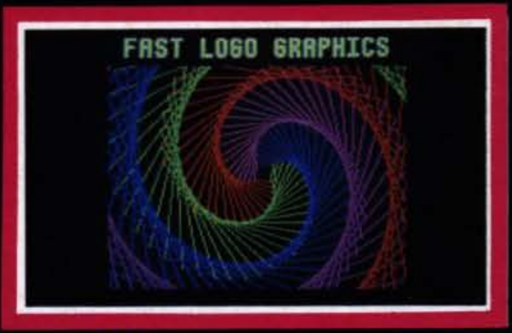
Software for the BBC micro

Graphics ROM









The Graphic Extension ROM
for the BBC Micro 32K

Our latest utility ROM includes over 28 new graphics related commands. These can be typed in like any normal commands and can of course, be included in BASIC programs. The commands are split into 3 distinct areas:-

1. Sprite graphics
   These are multi-coloured shapes up to 24 x 24 pixels in size.
   Once a sprite has been designed (using in-built routine) it can be plotted at any position on the screen and easily moved around. A sprite can also be part of a 'film' — a sequence of frames allowing animation.Up to 32 sprites or 'films' can be active on the screen at any time. A 'film' can contain up to 47 frames, each frame being any sprite image.

2. LOGO 'turtle' graphics
   By using simple FORWARD, BACKWARD, LEFT and RIGHT commands a 'turtle' can be moved very quickly around the screen, producing intricate patterns by the most user-friendly means. Including these commands in structured BBC BASIC programs provides a system faster and more powerful than many of the packages currently used to demonstrate the LOGO language.

3. The third section consists of a large number of general purpose commands, such as:-
   ★FILL which will fill ANY area on screen.
   Fast circle and arc drawing
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   Because this is a ROM, all the commands are instantly available, and has a built-in help menu showing the syntax of all commands. Supplied with a comprehensive manual and step-by-step fitting instructions, suitable even for the inexperienced. This ROM represents extremely good value for money.

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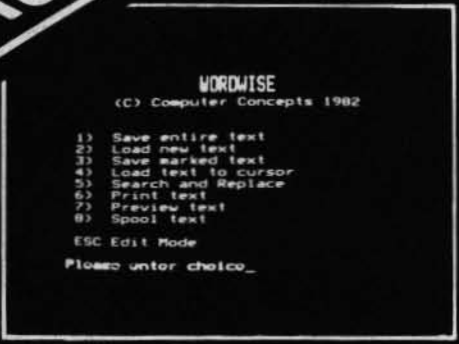
ROMS

SOFTWARE FOR THE BBC MICRO

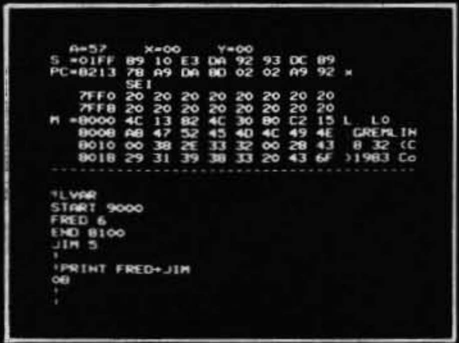


```
                WORDWISE
      (C) Computer Concepts 1982

   1)  Save entire text
   2)  Load new text
   3)  Save marked text
   4)  Load text to cursor
   5)  Search and Replace
   6)  Print text
   7)  Preview text
   8)  Spool text

   ESC Edit Mode

  Please enter choice_
```

WORDWISE 32K

The renowned word processing package. Still clearly the market leader with sales now over 20,000. This has become "the standard" word processor for the BBC Micro and is still receiving very favourable reviews. Wordwise will work with tape, disc or Econet and includes automatic word counting and full control over text entered into the system. Supplied with a detailed spiral bound manual and an excellent free typing tutor program. After 8 months on the market there is still no other product as simple to use and as powerful as Wordwise.

£39.00 + £1.00 p&p + VAT



```
   A=57     X=00     Y=00
S  =01FF 89 10 E3 DA 92 93 DC 89
PC=8213 78 A9 DA 8D 02 02 A9 92 x
         SEI
    7FF0 20 20 20 20 20 20 20 20
    7FF8 20 20 20 20 20 20 20 20
M  =8000 4C 13 82 4C 30 80 C2 15 L  LO
    8008 A8 47 52 45 4D 4C 49 4E  GREMLIN
    8010 00 38 2E 33 32 00 28 43  8 32 (C
    8018 29 31 39 38 33 20 43 6F )1983 Co
-----------------------------------------

*LVAR
START 9000
FRED 6
END 8100
JIM 5
*
*PRINT FRED+JIM
0B
*
*
```

GREMLIN 32K

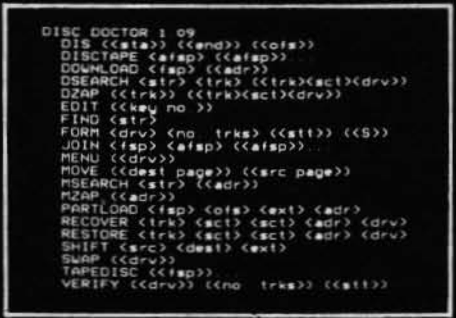
The **GREMLIN** system is a powerful de-bugging tool for 6502 machine-code programs. It includes all the usual features found in good machine-code monitors, such as memory search, intelligent memory move routines, memory editors etc. These work at byte, word or string level. A built in help menu can also be displayed at any time.

This ROM contains many more unique features such as an assembler as well as a disassembler. An extremely powerful expression evaluator is included allowing complex expressions to be entered in a format that is only normally available in high level languages. Variables are also allowed (any length) and may be included into expressions.

GREMLIN allows single stepping through machine-code programs. It is also possible (on to a printer or disc) to single step through graphic routines without disturbing the screen.

Supplied with full manual, this 8k ROM has more features than any other de-bugging package for the BBC machine.

£28.00 + £1.00 p&p + VAT

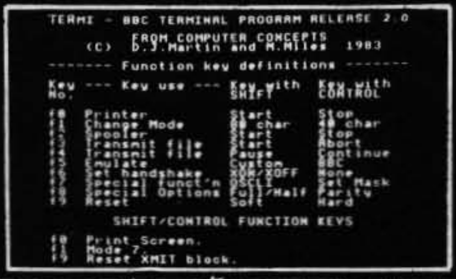


```
DISC DOCTOR 1 09
  DIS ((sta)) ((end)) ((ofs))
  DISCTAPE <afsp> ((afsp))
  DOWNLOAD <fsp> ((adr))
  DSEARCH <str> <trk> ((trk)<sct)<drv))
  DZAP ((trk)) ((trk)<sct)<drv))
  EDIT ((key no ))
  FIND <str>
  FORM <drv> <no  trks> ((stt)) ((S))
  JOIN <fsp> <afsp> ((afsp))
  MENU ((drv))
  MOVE ((dest page)) ((src page))
  MSEARCH <str> ((adr))
  MZAP ((adr))
  PARTLOAD <fsp> <ofs> <ext> <adr>
  RECOVER <trk> <sct> <sct> <adr> <drv>
  RESTORE <trk> <sct> <sct> <adr> <drv>
  SHIFT <src> <dest> <ext>
  SWAP ((drv))
  TAPEDISC ((fsp))
  VERIFY ((drv)) ((no  trks)) ((stt))
```

DISC DOCTOR 32K

This utility package has many special features for use with discs but also contains many other utilities that everyone will find useful: Function key editing, powerful disassembler, recovery of any data from the disc, merging of files, complete disc editor. Compatable memory editor, String search in memory or on disc, automatic tape to disc and disc to tape routines, built in help menus, formating of 35, 40 and 80 track discs, and also a special format that allows 60 files per disc.

£28.00 + £1.00 p&p + VAT



```
 TERMI - BBC TERMINAL PROGRAM RELEASE 2.0
          FROM COMPUTER CONCEPTS
    (C)  D.J.Martin and M.Miles  1983
 ------- Function key definitions -------
Key --- Key use --- Key with  Key with
No.                 SHIFT     CONTROL

f0  Printer         Start     Stop
f1  Change Mode     80 char   40 char
f2  Spooler         Start     Stop
f3  Transmit file   Start     Abort
f4  Transmit file   Pause     Continue
f5  Emulate         Custom    BBC
f6  Set handshake   XON/XOFF  None
f7  Special funct'n OSCLI     Set Mask
f8  Special Options Full/Half Parity
f9  Reset           Soft      Hard
      SHIFT/CONTROL FUNCTION KEYS
f0  Print Screen.
f1  Mode 7.
f9  Reset XMIT block.
```

TERMI 32K

This program enables the BBC machine to act as an advanced terminal when connected to another computer or to a modem via the RS-423 (RS-232) interface. This provides facilities to transmit data from disc and the spooling of data from the 'line' to the disc or printer.

Termi has 3 modes of operation — dumb terminal, BBC graphics terminal and customised intelligent terminals including DEC VT52.

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The BBC Sideways RAM System

The BBC Sideways RAM:

The most exciting add-on for the BBC micro, which many have been waiting for Acorn to produce!
Neater, more reliable and far more economical than plugging in more ROMs into your BBC!

What is the Sidways RAM?

The sideways RAM is a 16K (upgradable to 128K) memory board which fits into the rightmost ROM socket on your BBC micro. The sideways RAM is an essential piece of hardware for any BBC computer. Strategically integrated into the BBC system, the system is capable of:

Running Any Languages, Wordprocessor, Electronic Spreadsheet:

The sideways RAM allows you to run any software normally available in ROM such as WORDWISE, VIEW, BEEBCALC, BASIC2, FORTH, PASCAL, BCPL, EXMON, DISK DOCTOR, NET FILING SYSTEM, ENHANCED 16K DISK FILING SYSTEM, SPEECH ROM etc. . . . These programs can be saved on disk or tape and loaded later in seconds into the sideways RAM.

Giving 27K Bytes Free with Acorn Disk Filing Ststem:

The sideways RAM can also be used to increase available memory for BASIC, BEEBCALC, WORDWISE, VIEW etc. by moving disk workspace into sideways RAM. PAGE is then set to the lowest possible value, i.e. &OEOO.

Creating and Maintaining a Silicon Disk on your Computer:

If you have 128K of sideways RAM, 112K of it can be turned into a silicon disk. The system will address your floppy disk as drive 0 and the silicon disk as drive 1 but with a difference! The silicon drive has the capacity to load a 32K program faster than you can remove your finger from the 'RETURN' key with no clicking noise, no on/off LED, no wear. It can make you a backup floppy in 15 seconds from the original. The sheer speed of sideways RAM makes 3D-graphic look like a movie picture. It's life in the fast lane!

Free Software with Every Sideways RAM System:

The Sideways RAM comes complete with lots of free software, now and with future updates. The free software includes "ROMCOPY" to move sideways ROMs to disc (or tape), STL0E00 to move disk filing system workspace into sideways RAM thus giving 3K bytes extra memory to BASIC, WORDWISE, VIEW, BEEBCALC, etc., STLDISC to create and maintain a SILICON DISK on your system with extra disk facilities and demonstration programs.
Future releases include our own DFS (JAN. 84) and SILICON 100K DISK BASIC (MARCH 84). All sideways RAM system software is given in basic source code. Users are encouraged to personalise and benevolent contributors will be rewarded with free hardware gifts.

Increase the Computer Power by Increasing Sideways RAM:

The BBC comes with 32K of RAM and has access to a maximum of 3 languages. The BBC with 16K sideways RAM has 48K of RAM and has access to a wealth of languages. The BBC with 32K sideways RAM can run 2 loaded languages at the same time. The BBC with 128K sideways RAM can run 8 loaded languages at the same time. The power of the BBC relies on its intelligent use of software where several sideways ROMs execute different tasks such as filing, processing, debugging etc. The bigger the sideways RAM, the bigger the task the computer can handle.
The sideways RAM is such a powerful and promising device that ACORN HAS PLANNED to release a similar system on the ELECTRON.
Rather than being a software piracy aid, the Sideways RAM system is the key solution to selling more software to BBC computer users. This is because powerful sideways software can be shared by users of the same network and sold cheaper on tape, disk or by electronic mail.

Beautifully Designed, Easily Installed, no Soldering Required:

The sideways RAM was first introduced and the first issue sold out at the ACORN USER SHOW (Sept. 83, London). The new issue has been exhibited at the PCW SHOW (Oct/Nov. 83, London) and will be on general distribution release at the BBC USER SHOW (Dec. 83, Westminster, London). The system can be installed in 2 minutes by yourself or most BBC dealers and requires no soldering.
HERE IS HOW:
Open the computer case, plug into the rightmost sideways ROM socket the cartridge base unit (see picture 1). Install your sideways ROMs, one at a time, onto the mini ROM cartridge (see figure 2), insert the cartridge into the base unit and CHAIN "ROMCOPY". This program will save your sideways ROM on disk or tape. Locate S20 and S22 jumper blocks on the computer board. Replace the jumpers with control wires from the base unit. Install the sideways RAM card in place of the mini ROM cartridge. Switch on the computer and *LOAD any program saved with "ROMCOPY". Press the BREAK key. Call up your sideways software as usual. For example, *WORD etc.
Further upgrading to 32K or to 128K is very simple: from 16K to 32K is by straight exchange (cost: £12+p&p), from 32K to 128K is by plugging in the SOLIDISK extension (see figure 3) onto the 32K sideways RAM. It costs just £76 plus p&p.

OTHER PERIPHERALS FOR THE BBC MICRO:

We are stockists of the EPSON range of PRINTERS, the SANYO range of COLOUR MONITORS, disk drives from various manufacturers and floppy diskettes (WABBASH, VERBATIM, DATALIFE, DYSAN etc.). Ring us for a quotation.

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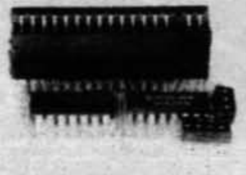
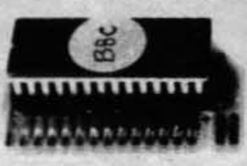
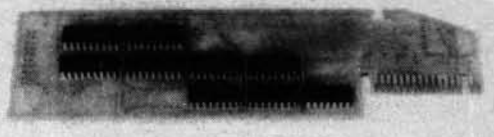
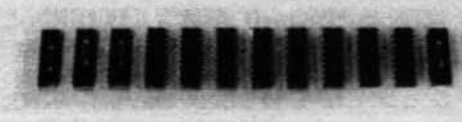
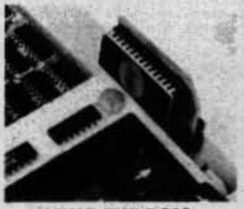

THE CARTRIDGE BASE

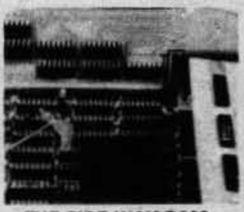

THE ROM CARTRIDGE

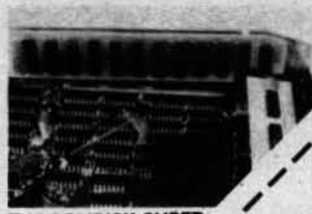

THE SIDE WAY RAM CARD


THE SILICON DISK EXTENSION

INSTALLING THE CARTRIDGE BASE


USING THE ROM CARTRIDGE TO TRANSFER SOFTWARE ON DISK


THE SIDE WAY RAM NOW REPLACES THE ROMS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Ring to check compatibility if you are NOT using Watford, Acorn or Acorn DFS. **Hotline 0606 48511**

STOP PRESS – REPLICA II NOW AVAILABLE

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(now compatible with Acorn, Pace and Watford DFS)

In addition to the features below it also works with Acornsoft "locked" programs plus very long programs (HEX &E00 to 7B00)

REPLICA II and THE KEY give you, the user, what you want. You have bought your disc drives and now want to take advantage of them, but most of your favourite software will not run with the disc interface and even if you are prepared to pay out for disc versions of everything you can't get them and if you have 80 track drives you might as well give up. If you know everything about the DFS, memory locations, saving procedures etc, you can probably save some of them onto disc. What's a half hour per program, and it only takes a few minutes to find, load and relocate it each time (if you can remember the sequence).

On the other hand you could buy REPLICA, enter a few details i.e. 1) program name, 2) number of sections, 3) CHAIN, *RUN or *LOAD 4) press play and then make a cup of tea whilst the program loads from cassette for the last time. When you return the program will be on the disc and shown in a menu under the name you gave it. There are now only two alternative storage methods required and one of them will work with most programs. There are some exceptions to REPLICA II but the number is insignificant. Many users have purchased 4 or 5 copies of REPLICA and it is now the recognised format that dealers use to display their software.

REPLICA II will now hold up to 16 programs on each disc, they can be erased if required and a new batch saved, but why not just buy another REPLICA and keep your programs on disc permanently (it only costs approx. £1.00 per program).

REPLICA II £12.00 (state 40 or 80 track)

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THE KEY provides you with the facilities that should have been included in the Disc Filing System and also helps you reach the parts other discs can't reach. This new version of THE KEY has been made compatible with ECONET at the request of many schools, colleges and universities. The whole program has been turbocharged and the facilities are:

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2) FORM80 – now much faster.
3) BACKUP – has that effect on some people because it allows even most of the protected discs to be backed up – faster too.
4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY £12.95 (state 40 or 80 track)

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The first and best CAD program for the BBC Micro. Used in education, business, art, video etc. Recommended by LASERBUG, BBC MICRO USER, PCW, SOFT and thousands of satisfied users (see earlier issues of BBC Micro User for screen pictures). In a comparative review of the major CAD programs PCW said: "Considering the options it is by far the best value". Need we say more, if you need a graphics utility then this is it.

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SHADOW works with 99% of all known programs including those with "locked" sections or those containing 300 BAUD sections. Handles programs of any length and works with any operating systems.

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BOTH PROGRAMS £8 incl.

(This program for personal use only).

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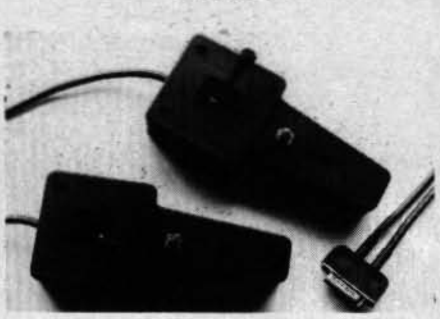

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Every word you spell correctly helps one of your knights in their struggle. Spell a word wrong and the infidels will have the advantage.

Both of these educational games are available for use on the BBC Micro and can be obtained from W H Smith or any other good bookshop or computer store.

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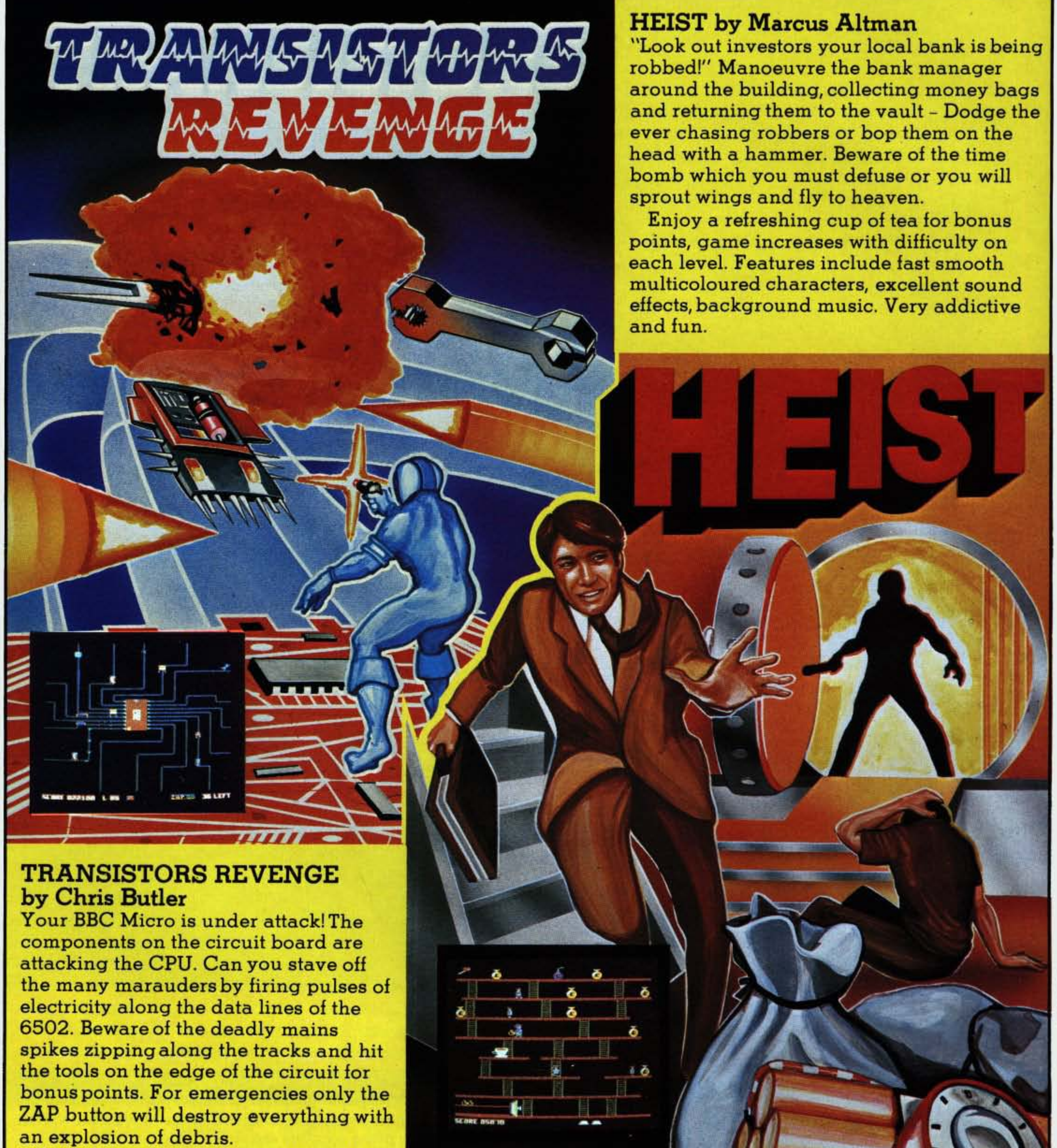

HEIST by Marcus Altman

"Look out investors your local bank is being robbed!" Manoeuvre the bank manager around the building, collecting money bags and returning them to the vault – Dodge the ever chasing robbers or bop them on the head with a hammer. Beware of the time bomb which you must defuse or you will sprout wings and fly to heaven.

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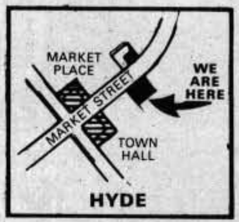

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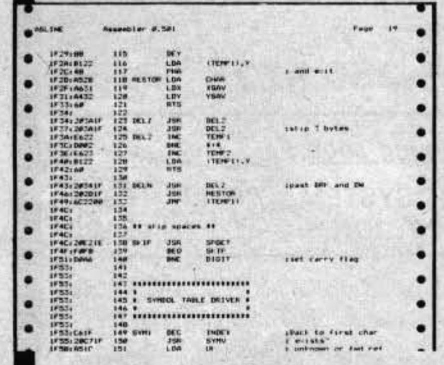

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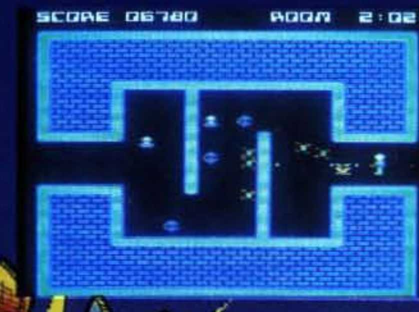

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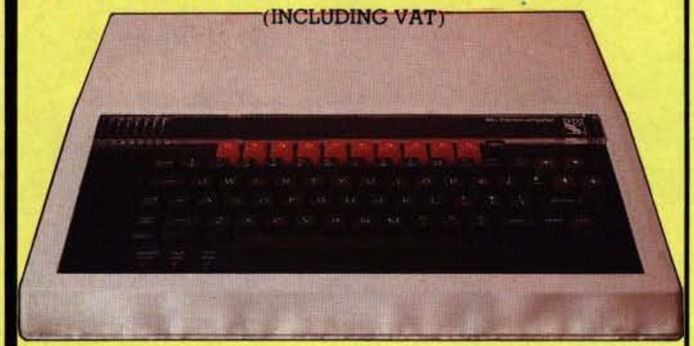

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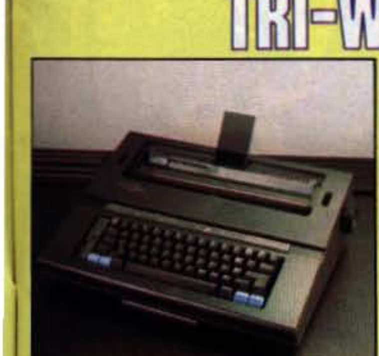

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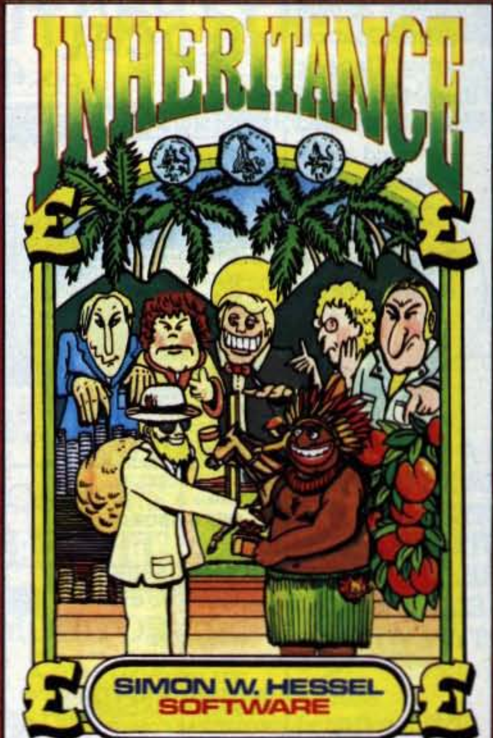
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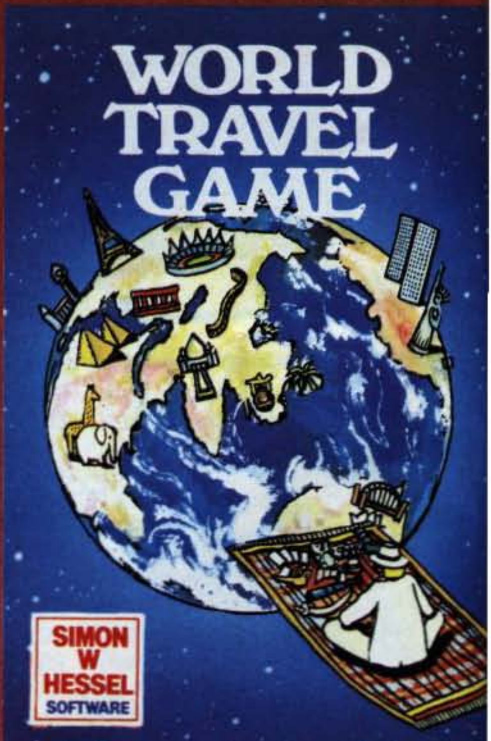
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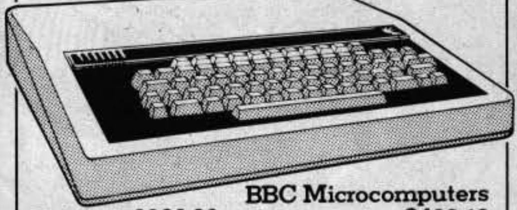

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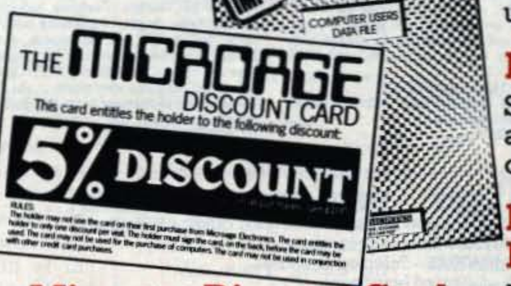
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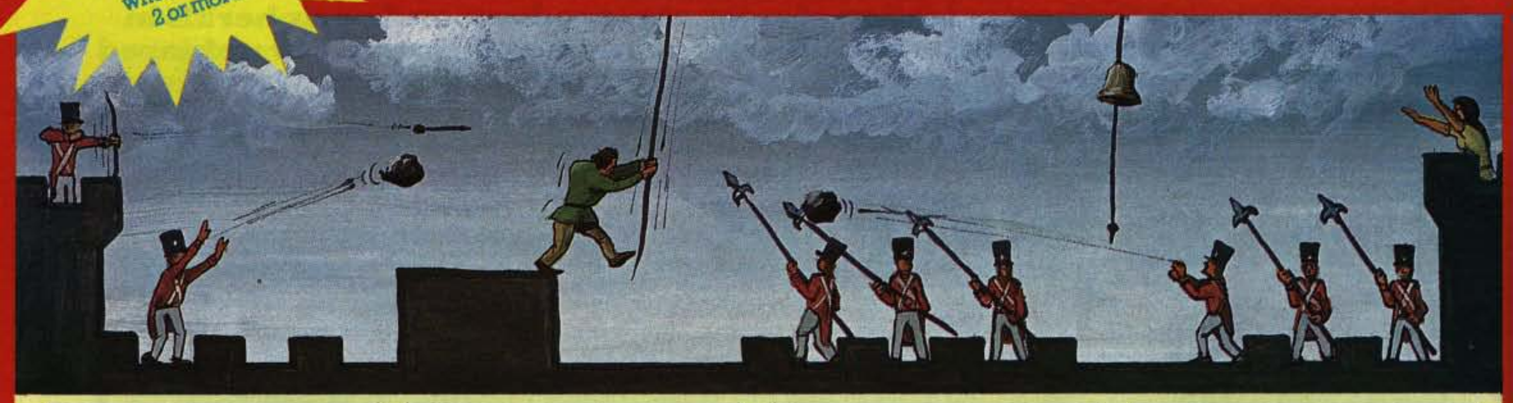
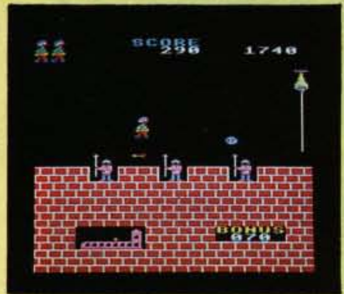
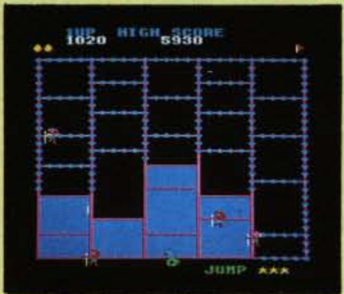
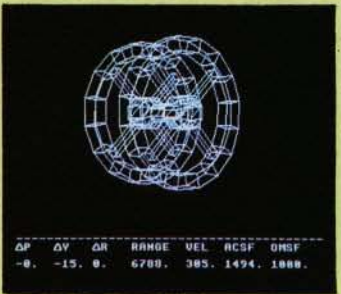




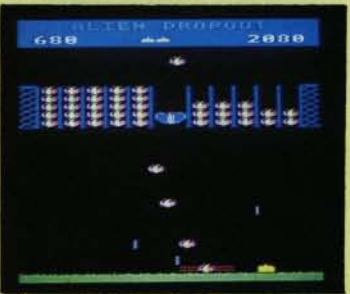
HUNCHBACK (32K) £7.95
Beautifully detailed animation (the best we've yet seen!) as Quasimodo leaps over the ramparts dodging rocks and arrows, swinging on ropes, and avoiding the guards's spears as he attempts to rescue Esmeralda. Twelve different screens of action! This program is sold under licence from Century Electronics Ltd; we have exclusive rights to its sale for use on the BBC micro.
(For use with KEYBOARD or JOYSTICKS).
"It is an extremely good version of the arcade game ... thoroughly recommended." ... BEEBUG MAGAZINE



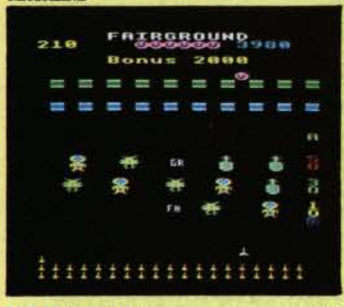
CRAZY PAINTER (32K) £7.95
The only full-feature version available for the BBC micro. On the first screen, you take the part of a monkey being chased by African tribesmen. If you manage to survive by painting-in all the squares, the bonus screen features the monkey trying to reach his bunch of bananas. After that, you take control of a paint-roller and each square painted-in adds to your score. But beware ... the teddy-bears are now in hot pursuit. Superb animation and sound-effects.
(For use with KEYBOARD OR JOYSTICKS).
●●● *NEW RELEASE* ●●●



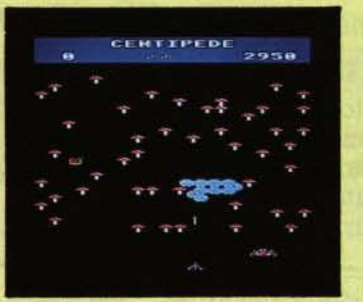
2002 (32K) £7.95
A space docking simulator using 3D graphics to model the motions and responses of the ORION 4 spacecraft. Your mission is to pilot the shuttle to a "soft dock" with the space station. PITCH, YAW, ROLL, FORWARD, LATERAL and VERTICAL engines are provided together with orbit manoeuvering booster engines. 6 skill levels provide for the completely inexperienced pilot as well as the fully-fledged commander.
●●● *NEW RELEASE* ●●●



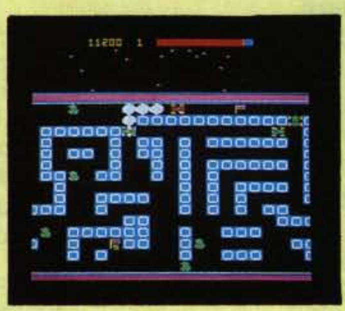
ALIEN DROPOUT (32K) £7.95
A novel and unusual program. Arcade-action with this enthralling multi-stage shooting game. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. Hi-score, rankings, and sound effects.
(For use with KEYBOARD or JOYSTICKS).
"... this game is as good as any on the market." ... HOME COMPUTING WEEKLY.



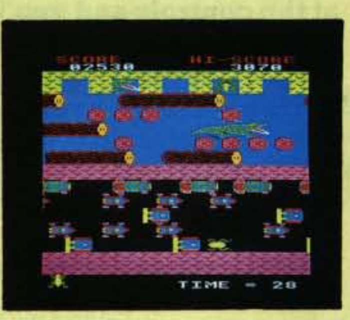
FAIRGROUND (32K) £7.95
An exciting target-shooting game! Bonuses are scored for spelling out the word FAIRGROUND by hitting the appropriate target letters, and for shooting all the targets. Extra bullets are obtained by shooting the numercial targets, but watch out for the "smileys" who are intent on stealing your bullets. Music, sound effects, hi-score, and rankings.
●●● *NEW RELEASE* ●●●



CENTIPEDE (32K) £7.95
Incredible arcade-style game featuring mushrooms, snails, flies, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more lively and the number of mushrooms increases.
(For use with KEYBOARD or JOYSTICKS).
"Visually this game compares well with the arcade version, being colourful and clear." ... YOUR COMPUTER



ROAD RUNNER (32K) £7.95
The only full feature machine-code version available for the BBC micro. Features include: scrolling screen, radar display, 3 pursuing cars, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty, and sound effects.
(For use with KEYBOARD or JOYSTICKS).
"I enjoyed the game very much ... the graphics are excellent ... movement is smooth and fast as only machine code can produce." ... HOME COMPUTING WEEKLY



FROGGER (32K) £7.95
Not just another version of Frogger ... this is the arcade-action version that you've been waiting to see. Graphically brilliant with gaping-mouthed crocodiles, diving turtles, flies, and frogs that flex their legs as they jump along. Increasing difficulty, and responsive controls.
(For use with KEYBOARD or JOYSTICKS).
"... very good indeed ... fast flicker-free graphics and a frog that really hops!" ... BEEBUG MAGAZINE

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THE MICRO USER

NEWS

January 1984

Award for Hauser?

HERMANN Hauser, joint managing director of Acorn, has been nominated for the RITA Personality of the Year Award.

RITA stands for Recognition of Information Technology Achievement. The aim of the awards is to heighten national awareness of advances in information technology and to reward outstanding achievements in that field.

The award will be presented at the opening of the Which Computer Show.

ROYAL GIFT IS A BOOST FOR ACORN

ACORN has made a major breakthrough in its campaign to secure a foothold in the educational market in India – thanks to a little help from the Queen.

For following a regal gift of five of the company's microcomputer networks to the President of India, the company has announced it has won "a substantial order" for the subcontinent.

The computers formed part of the traditional exchange of gifts to mark the occasion of the Queen's state visit to India.

In all, the royal present consisted of 30 BBC Micros in the form of five 6-station "Econet" networks, including monitors, disc drives and other peripherals.

Achievement

Now destined for India's leading universities for the development of software for schools, the gift was made at the suggestion of the Department of Trade and Industry to represent Britain's achievement in high technology.

The timing couldn't have been better for Acorn, for the company has been attempting to make inroads into India's educational market recently with the backing of the DTI.

Now the Queen's timely gift seems to have tipped the balance in its favour.

China tests Econet

ACORN seems intent on setting up a BBC Micro empire on which the sun will never set.

No sooner was a specially adapted micro launched for the US market than Acorn started negotiations with authorities in India and the People's Republic of China.

These Asian talks are at a delicate stage, said an Acorn spokesman, "with nothing finalised".

The deal with China has reached the stage of trials of the BBC Micro's Econet network.

Acorn is confident that the BBC Micro will meet the needs of the educational establishments in both countries.

BBC Micro aids deaf children

SUMMERFIELD School for Children with Impaired Hearing is very much involved in using the BBC Micro in education.

At present the principal, Mr Eulenkamp, is compiling a report on educational software to see how useful it is for deaf children.

He would very much like to hear from software houses and authors who think their programs could be of use with deaf children. He can be contacted at 141 Worcester Road, Malvern WR14 1ET.

ACORN SWITCHES BACK TO BASIC I

TO the amazement of their dealers, Acorn Computers has started supplying BBC Micros with Basic I as opposed to the Basic II that has been installed in machines since last January.

Customers have been buying the micros, taking them home and finding that they have the older version of the Basic chip.

"We were given no warning", said an irate dealer. "The machines with Basic I just turned up.

"Several customers have brought them back complaining they weren't new!"

Reasons

An Acorn spokesman would not be drawn on the reasons for using the older Basic chips. He was, however, prepared to elaborate on the role of Basic II.

"Basic II is not a bugs-fix, it's an enhancement of Basic I. Acorn do not consider it a replacement for Basic I".

He then went on to say that Basic I was the "specification" chip and that Basic II was a "gift".

Acorn had "no commitment to produce Basic II as a right", the spokesman added.

Technology's caring face

KEEP your eyes open for the "Concerned Technology" exhibition. At present on a nationwide tour, its aim is to introduce manufacturers and the public to the uses of new technology in the design and development of equipment for disabled people.

On display is an extensive range of aids developed to help them to lead a fuller and more independent life – many of them making use of the BBC Micro.

Now – CAL packages for nurse training

GARLAND Computing, a software firm from the south-west, is moving into the new and expanding field of providing computer assisted learning packages for nurse education.

Garland, a team of professional teachers, originally aimed their product at the education market covering subjects like biology, physics and maths.

It is their biology software, designed for schoolchildren, that is arousing interest in nurse education centres across the country.

The reason – software specifically aimed at this group is practically non-existent.

This despite much talk about CAL being used to train the nurses of the eighties and a three year investigation of its possibilities being partially funded by the DHSS.

While the talking continues Garland has gone it alone and found a new market.

Business is big business

AS more software reaches the market so the BBC Micro is increasingly becoming a business-orientated machine. This month sees two more business software releases.

The simplest is the Cashflow Forecast package from Data One Systems which can be used on both model A and B.

This, it is claimed, allows a 12 month forecast of income and expenditure to be created without having to become a computer whizz-kid.

From HCCS comes an integrated system of disc-based software for the small business user covering the range from stock control and payrolls to invoicing and order processing.

Consultancy service

BUSINESS microcomputer users with problems now have a national consultancy service they can turn to for help.

It has been launched by Cambridge Systems Technology, a firm formed by David Oliver and Martin Baines, previously of Torch Computers.

It aims to provide help for the business user at every level from the initial selection of a system, through its implementation and even up to dedicated software design.

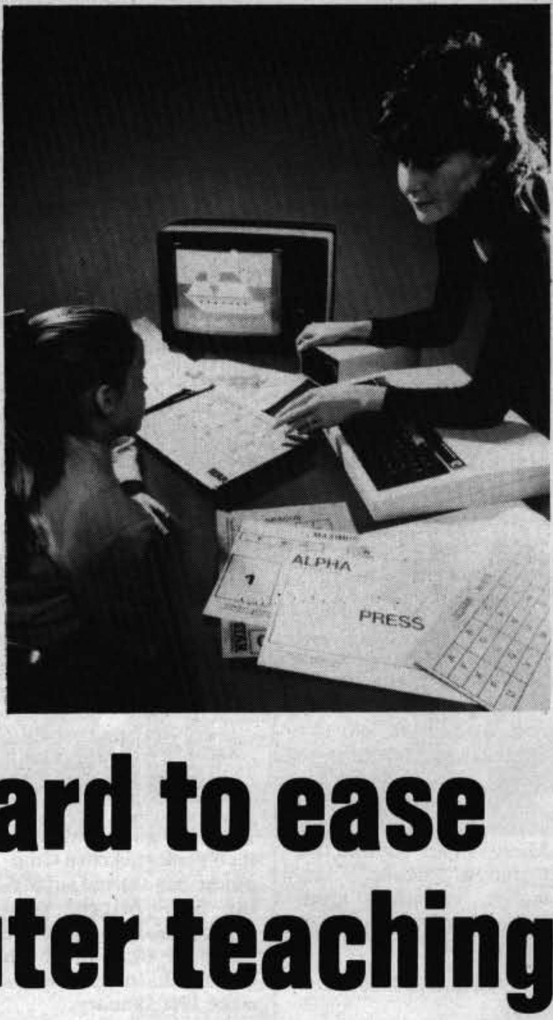
EXPORT DRIVE

BRUSSELS is the venue for the latest project in Acorn's export drive.

Together with the importation of the BBC Micro into Belgium, they're opening an Acorn Computer Centre.

The prestigious showroom is located in one of the best commercial streets in Brussels.

The opening, planned for mid-January, will be attended by Chris Curry, the UK ambassador in Belgium and several Belgium cabinet ministers.



Keyboard to ease computer teaching

CONCEPT keyboard is an approach to educational computing said to allow easier pupil-computer integration.

The keyboard takes interchangeable A4 overlays which define the number, shape, size, colour, position and legending of the keys.

Each program can use a separate overlay, with keys for the application.

The ability to respond directly to programmed questions, via keys labelled "YES", "NO", "TRUE", FALSE" improves pupils' interaction with the computer.

The keys can be made large enough for visually or physically handicapped users.

The flat pressure-sensitive keyboard also makes it easy to design teaching programs.

A program to teach shopping skills, for example, could use a model trolley and an overlay showing the floorplan of a supermarket with the various aisles and counters.

The keyboard can be used with any micro. It is of value in education work and where the normal Qwerty keyboard presents operating difficulties.

The keyboard has an 8 × 16 matrix of touch-sensitive areas, each producing a 7 bit Ascii code which the programmer defines as required.

A bleeper with on/off control, and two additional user-dedicated touch pads, are also provided.

★ ★ ★

TWO versions of a new drawing program to assist professional designers have been released by AB Designs for the BBC Model B.

Wong to make BBC Micros

BBC Micros for the US are to be manufactured in Hongkong.

Wong Electronics, which already manufactures Acorn products for Australia and the Far East, has won a 45 million dollar order and intends to produce 50,000 of the micros by October 1984.

The micros, which sell for 995 dollars, come complete with disc interface, speech synthesis chip and Econet.

Aimed specifically at the vast US education market, each is supplied with two different sets of teacher training documentation.

Also a panel of educationalists has been set up to monitor all educational software written for the machine.

STILL IN BUSINESS

REPORTS of the demise of Acorn's ink-jet printer have been greatly exaggerated, says an Acorn spokesman.

He said there was no truth in the rumour that they were dropping it in favour of making a deal with one of the leading printer manufacturers.

IEEE interface

BEATING the official Acorn product to the market, Cambridge Systems Technology has launched an IEEE interface for the BBC Micro.

Called Procyon, it will allow users to communicate with the wide range of instruments operating to the IEEE-4888 international standard.

Supplied with Procyon is an IEEE filing system in ROM which can cope with up to 16 devices.

When it comes to the crunch...

THE latest 3 inch disc drive from AMS is claimed to provide the most durable form of storage for the BBC Micro available.

The new discs, which hold 100k per side, are encased in plastic sleeves.

Said marketing director Nick Pearson: "We knew these new discs were really strong, so we put a couple in the road and drove over them at various speeds up to 60 mph.

"Not only were they not cracked or anything, but they worked perfectly when we used them in the drives.

"If they can stand that sort of punishment they'll withstand anything that schools, companies or the general public hand out", he added.

Dow's new firm

SANDY DOW, former sales manager of Acorn Computers, has formed a new company, R.H. Electronics.

The Cambridge company is involved with the design, development, sales and marketing of peripherals and software for the BBC Micro.

On the hardware side it has the already successful R.H. Light Pen.

This is joined by a new peripheral called the Interbeeb, a system which, it is claimed, allows the BBC Micro to control the outside world.

Telesoftware gets a warm reception

SINCE its launch in September the BBC Telesoftware Service has been inundated with praise from enthusiastic users.

Said Lawson Brown, head of Telesoftware: "We expected a lot of feedback from schools. What's taken us by surprise is the number of letters we've had from the general public".

The most popular programs supplied by the service have proved to be those that access Ceefax pages.

Telesoftware plan to supply more of these, and schemes are underway to allow users to access other databases – the first of which will supply business information.

TELESOFTWARE SCHEDULE

January 9 to 22: *Shell Sort, Anagram, Box Clever (word shapes). Plus two other educational programs.*

January 23 to February 5: *Quicksort, Watchperson (logic game), Axes of Symmetry, Build (simple computer design) plus two other educational programs.*

★ ★ ★

THE BX80 colour printer for the BBC Micro, announced by Integrex, allows all the BBC Micro modes, including mode 7 teletext, to be printed using the screen dump listing. It costs £495.

MODEL B ON THE EXCHANGE

THE BBC Model B is to be the basis of a new computerised information service to be launched in the New Year by brokers Scrimgeour, Kemp-Gee.

Already the largest supplier of information to the Stock Exchange's Topic service, the firm has spent two years perfecting the hardware and software for the new system, called Dog Fox.

The system uses BBC Micros as terminals linked to Scrimgeour's mainframe data bank. The micro's advanced graphics facilities will allow far more flexibility in the way customers can have their data presented than present systems.

Basic course

FRODSHAM based Micromode have developed the first correspondence course to teach Basic for the BBC Micro.

The 10 lesson course covers all the major features of BBC Basic with the emphasis on structured programming.

Along with the usual correspondence course features Micromode also provide a phone-in service which clients can use to get an immediate response to their questions.

ZX printer interface

A LEEDS firm, W.D. interfaces, has produced an interface which allows the BBC Micro to use the ZX printer – the cheapest on the market.

The device, which comes with full machine code software and instructions, requires no modifications to either the BBC Micro or the ZX printer.

It is attached to the micro's 1mHz bus and has its own mains-derived power supply.

Retailing for just under £30 its low cost is aimed at making it an attractive proposition for schools and the more thrifty BBC Micro users.

Tireless scribe

DOCUMENTS of up to 255 pages long can be created with the latest word processing program for the BBC Micro, Merlin Scribe.

Distributors Bucon claim that it is the first package to make proper use of the Beeb's disc system.

Its main advantage is that the size of a document it creates is not limited by the amount of free computer memory, claims managing director Roy Morgan.

Scribe costs £59.95 and is supplied on a chip with printer utilities on disc.

Camps for computer boys

ELECTRONICS expert Paul Beverley is well known to our readers as a regular contributor to *The Micro User*.

However Paul, a deeply committed Christian, is also widely involved in evangelical work.

Next summer he will be combining these two areas of endeavour when he leads two camps for 13 to 16-year-old boys who wish to learn more about the links between electronics and computing.

In the evenings the participants will have the chance to learn more about what it means to be a Christian in today's world.

The camps, to be held at Letton Hall in Norfolk, are from August 11 to 18 and 18 to 25. For more details contact Sue Beverley, 57 Cambridge Street, Norwich, NR2 2BA.

Acornsoft offerings start row

Acorn move into the CAL field

ONCE again Acorn has demonstrated its commitment to computer assisted learning.

It has bought out the whole of the ICL education section, now renamed Acorn Computer Educational Services.

ACES will be headed by Jeff Wood and the whole concern is being moved to new offices at Slough which the firm will share with Acorn International.

A spokesman was quick to point out that there would be no conflict of interest with Acornsoft.

ACES would have a training role, producing educational software for schools while Acornsoft would be concentrating on the home education market.

In order to service this market more fully Acornsoft will be distributing the widely-acclaimed range of educational games from ASK.

More shows on the way

PLANS are well advanced for the next series of BBC Micro User Shows.

Following the tremendous success of our shows so far, we shall be staging four London shows this year, in March, June, October and December – and we've plans for special events to make them more exciting than ever.

We've not forgotten the rest of the country, either. We've provisionally settled on August for this year's Manchester BBC Micro User Show, and are planning several other venues.

'SEXIST' DUO UNDER FIRE

TWO of Acornsoft's latest releases have caused a flood of controversy in the world of the BBC Micro, not least from feminist groups.

Described by critics variously as "rather silly" and "extremely bad taste", the programs "I Do" and "The Dating Game" are Acornsoft's attempt to cash in on the psychological testing fadism prevalent on the other side of the Atlantic.

Described as "marriage guidance by computer", "I Do" is based on a series of questionnaires used by controversial psychologist Hans Eysenck in his latest book.

Character

The program tests aspects of a person's character such as aggressiveness, marital satisfaction, political stance, sex drive and sexual satisfaction.

One of the features causing offence is its feminism versus anti-feminism scale which has been included "because the nature of feminism, with its tendency towards confrontation as opposed to accommodation, can lead to marital difficulties".

"The Dating Game" consists of four separate programs – a computer dating and compatibility program, a "love style" analyser, a "preferred relationship" indicator and a "dating skills" examiner.

The compatibility ratings cater for both friendship and romantic attachment and, Acorn say, work for homosexuals as well as heterosexuals.

Said one psychologist: "The programs could be fun – but shouldn't be taken too seriously. For instance, they are supposed to point out the areas where a couple are in disagreement.

"I think most couples can manage that without a computer".

Knight in tourney

WHITE Knight, BBC Soft's chess program reviewed in our December edition, was joint winner of the computer chess competition held at the PCW Show.

The contest was in the form of a round robin in which the chess programs played each other.

White Knight, written by Martin Bryant, tied for first place with a program running on a micro costing five times as much as a BBC model.

BARRY WOOD'S TAILPIECE

NEW YEAR is always a sad time for our beloved editor. This year I stumbled over him in our local, tears in his eyes, clutching a copy of the New Year's Honours list.

"Overlooked again", he sobbed". I'm the VDU0 of computing".

"What's that?" I asked, thinking I must have misheard.

"Ignored by the system, that's what".

★ ★ ★

QUOTES of 1983

"Aren't the second processors in the shops?" – **Chris Curry, September.**

"Who's Barry Wood?" – **Acorn spokesman to Barry Wood.**

"We're not going to make the mistakes with the Electron that we did with the BBC Micro". – **Acorn spokesman.**

"No I'm not Barry Wood". – **Barry Wood.**

"There will be 150,000 Electrons in the shops by Christmas". – **The same Acorn spokesman who wasn't going to make the mistakes.**

"Well, go on then, just one more pint . . ." – **The editor, frequently.**

". . . but don't quote me". – **Nearly everyone in the micro trade.**

"I don't know about that – Acorn never tell me anything". – **Acorn PR man.**

★ ★ ★

A FEMALE contributor complained to our editor, "Your magazine is sexist".

When asked to quote the offending pages, she replied, "Well I haven't any actual examples, it's just a feeling I get".

Women's intuition, no doubt . . .

★ ★ ★

I'VE written a New Year's resolution generator that should please everyone.

```
10 P. "I will not
     use GOTO".
20 GOTO 10
```

★ ★ ★

ACTUALLY, I did make one New Year resolution. As I told my Acorn contact, "This year I'm going to tell the absolute truth about Acorn".

I swear, he went white.

★ ★ ★

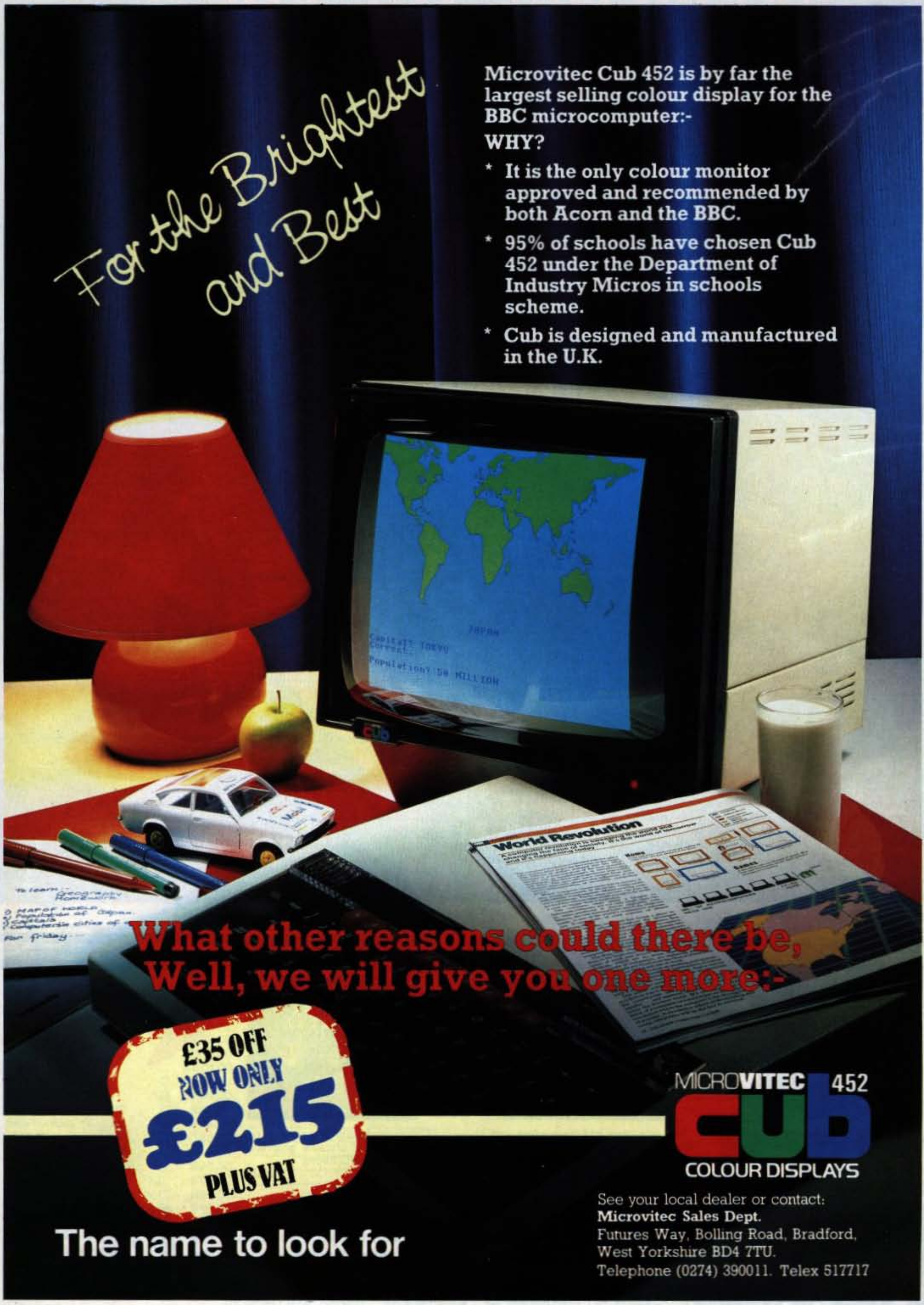
SO Acorn are selling micros with Basic I again, are they? Let's just hope they don't find a caseful of 0.1 ROMs about the place while they're at it . . .

★ ★ ★

WELL, first of all it was 150,000 Electrons before Christmas, then it was 100,000. After that it was 60,000, then it was 40,000. Let's face it, from the way those figures are declining, the thing sounds like an endangered species . . .

★ ★ ★

I THINK we're paying our technical editor too much. Last week I heard him say, "I'll have to get another printer, the print-out from this one's getting faint".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- **Cub is designed and manufactured in the U.K.**

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Telephone (0274) 390011. Telex 517717

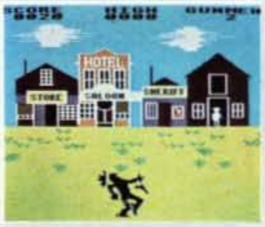
EXPERIENCE THE VORTEX!

the invasion continues

We continue the invasion this month with our latest and most exciting release yet. Have you the courage to enter the VORTEX? – You'll need all your senses and co-ordination tuned to perfection to avoid being fragmented by asteroid storms or vaporized by aliens. Each second you remain intact, your velocity will continue to increase as the vortex draws both you and all the surrounding debris into it's clutches. The point is inevitably reached where even your super human reactions are too slow to avoid collisions with asteriods, and your ship is destroyed with a blinding flash and a cascade of radioactive particles. This is definately our best game yet, from the author who created Gunsmoke, 3D Bomb Alley and Attack on Alpha Centauri. VORTEX uses keyboard or joysticks, with the option of sound effects and a pause control. (Seat belts recommended but not included!) The true three dimensional illusion will captivate your senses, as you come face to face with the VORTEX. A 3D space voyage for the BBC micro model B for just £7.95 on cassette or £11.95 on disc.

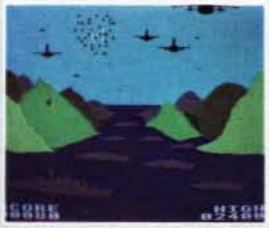
Other programs available for the BBC Micro Model B:- Cassette £7.95 inc. Disc £11.95 inc.

GUNSMOKE



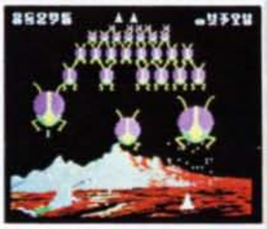
"... the graphics are excellent and the whole thing well designed."
... "a game for the family – simple, but enjoyable"
THE MICRO USER

3D BOMB ALLEY



"This is a very addictive game and is good value for money"
BEEBUG

ATTACK ON ALPHA CENTAURI



"The game features some of the best and most unusual graphics yet for the BBC micro"
BEEBUG

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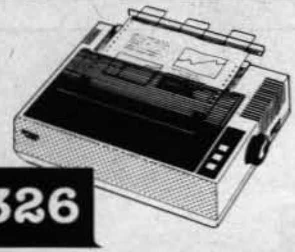

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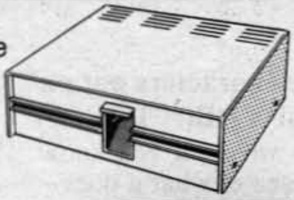

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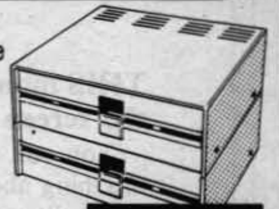

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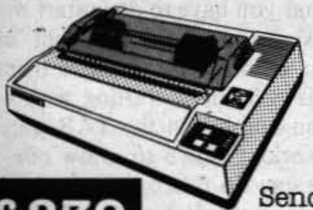

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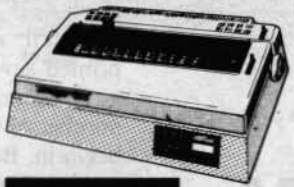

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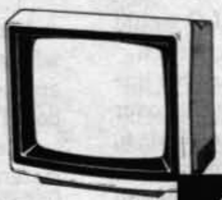

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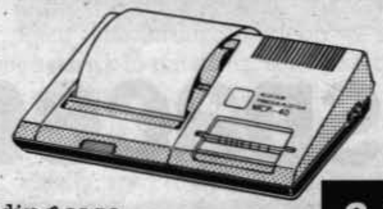

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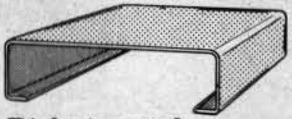

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Disk storage boxes .... £20.00 (takes 80)
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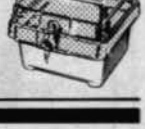

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BBC %DC

Part nine of MIKE BIBBY'S introduction to programming

Get really spaced out with a touch of TAB

THIS month we're going to learn how to space characters out on the screen with the use of the Basic statement TAB( ).

You can think of TAB as standing for tabulation which, if you know anything about typewriters, should give you a good idea of what it does – TAB allows you to pick the column your PRINT statement works in.

For example, with your computer in Mode 6, try:

```
PRINT TAB(10) "HELLO"
```

You'll notice that HELLO gets printed several columns from the side.

The number in brackets tells you the number of the column that printing will begin in. Beware though, for – as in so many other things in computing – you begin counting with the number 0.

This means that the first column is column 0, the second column 1 and so on.

In the example above, HELLO would have started in the eleventh column.

The exact number of columns per line varies from mode to mode – we'll cover the exact differences shortly. In Mode 6, there are 25 lines of 40 columns each, so the rightmost column on any line would be given by TAB(39).

TAB(40) would "wrap the printing round" to the next line. Program I illustrates the ideas – have a good look at it.

```
10 REM *** PROGRAM I ***
20 MODE 6
30 PRINT TAB(0)"*"
40 PRINT TAB(10)"*"
50 PRINT TAB(20)"*"
60 PRINT TAB(30)"*"
70 PRINT TAB(39)"*"
80 PRINT TAB(40)"*"
```

One point you have to watch is that the bracket must directly follow TAB. Using TAB ( ) instead of TAB( ) will cause all sorts of problems.

Also, try experimenting with TAB numbers bigger than the line length. Then try 256 – you might be surprised at the results as 256 is a special number in computing. When we reach it, we often go back to 0 again.

We can achieve really powerful results by putting a loop variable between the brackets of a TAB statement. Program II uses this idea to obtain a diagonal line of asterisks down the screen.

```
10 REM *** PROGRAM II ***
20 MODE 6
30 FOR loop%=0 TO 23
40 PRINT TAB(loop%)"*"
50 NEXT loop%
```

Can you see a way of reversing the direction of the diagonal line? Think for a moment before reading on.

What you have to do is start with the asterisks across to the right of the screen, then gradually move them left.

This will entail starting with a high column number in the TAB statement and working down to a low one.

We can do this by altering the loop variable so that it decreases by one each time, starting with the high number. So we change line 30 to:

```
30 FOR loop%=23 TO 0 STEP -1
```

Nice as it is to be able to specify where on a line the asterisk should appear, it would be better still if we could pick the line it appears on as well.

We can do this with the TAB statement, by giving it two numbers inside the brackets, separated by a comma.

As before, the first number denotes the column. The second number tells us which line or row of the screen it will appear on. Try:

```
PRINT TAB(5,10) "HELLO"
```

and all will be revealed.

If you're into mathematics, you can think of the Mode 6 screen as divided into a 40 by 25 grid, the first number inside the brackets being an X co-ordinate and the second the Y co-ordinate. Even if you're not mathematical, Figure I should still make sense.

Remember that in computing we start counting at zero, so, just as the first column is specified by zero, so the first line is given by zero.

This means that TAB(0,0) refers to the top left-hand corner of the screen. Program III should make things clearer.

```
10 REM *** PROGRAM III ***
20 MODE 6
30 PRINT TAB(0,0)"*"
40 PRINT TAB(5,5)"*"
50 PRINT TAB(10,10)"*"
60 PRINT TAB(5,15)"*"
70 PRINT TAB(0,20)"*"
```

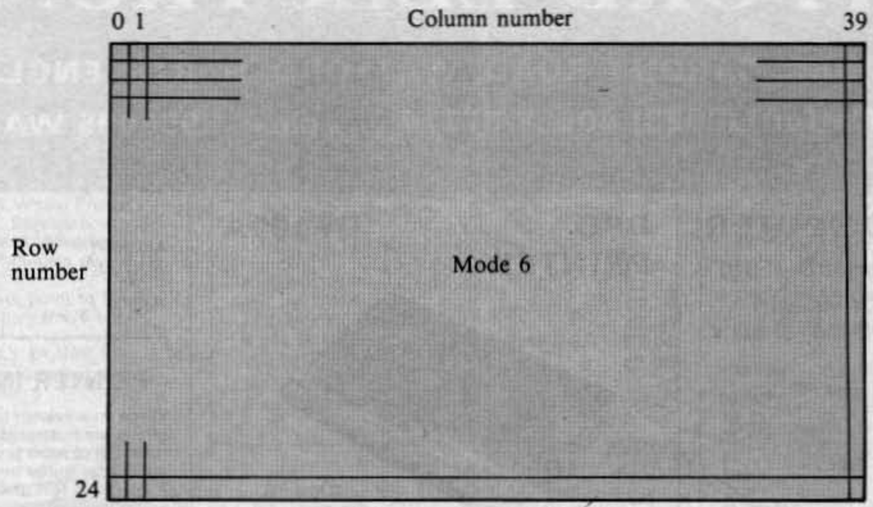

Figure I: Column and Row values in Mode 6

A point to watch is that, unlike TAB with just one number, TAB used in this way does not "wrap around" if your numbers are too large. Try:

```
PRINT TAB(45,45) "TEST"
```

to see what happens.

We can use this form of TAB to print out our diagonal of asterisks, as in Program IV.

```
10 REM *** PROGRAM IV ***
20 MODE 6
30 FOR loop%=0 TO 20
40 PRINT TAB(loop%,loop%)"*"
50 NEXT loop%
```

What do you think will happen if we change line 30 to:

```
FOR loop%=20 TO 0 STEP -1
```

Have a good think about it before you run it, remembering that we made a similar alteration to Program II.

Did you predict the outcome? Can you see what's going on? It's well worth thinking about.

If we really want to draw the other diagonal we should ensure that the column number starts at the high number, then "moves in" as the row number increases by one each time.

```
10 REM *** PROGRAM V ***
 20 MODE 6
 30 FOR loop%=0 TO 20
 40 PRINT TAB(20-loop%,loop%)"*"
 50 NEXT loop%
```

Line 40 in Program V achieves this by subtracting the loop variable *loop%* from 20 and using it to "index" the column number. The first time through the loop, the column number is 20, the row number 0. The next time the column number is 19, the row number 1 and so on.

You can stack TAB statements one after another following a print statement. Line 40 of Program VI uses this idea to use one loop to draw two parallel lines of asterisks.

```
   10 REM *** PROGRAM VI ***
   20 MODE 6
   30 FOR loop%=0 TO 20
   40 PRINT TAB(5,loop%)"*"
TAB(35,loop%)"*"
   50 NEXT loop%
```

You might like to use the techniques we've covered this month to produce the shape shown in Figure II with asterisks. You'll certainly master the ideas if you do!

Last month we made some triangles of asterisks. This month we're going to be producing some more. Only this time we're going to use the TAB statement to indent the rows of asterisks from the side of the screen.

We want the triangles to appear more like Figure IIIb rather than Figure IIIa, which we did last month.

Program VII does the trick.

```
   10 REM *** PROGRAM VII ***
   20 MODE 6
   30 FOR loop%=0 TO 10
   40 asterisk$=asterisk$+"*"
   50 PRINT TAB(10-loop%,loop%)
asterisk$
   60 NEXT loop%
```

In line 50 we use the same trick as in Program V, subtracting the loop variable from an "offset" – this time 10 – to provide the indent.

Each time through the loop we add one asterisk to the string, *asterisk$* that we are printing.

You might try to alter the program so that the triangle is printed upside-down.

Finally, try Program VIII. This, too, prints out another triangle of asterisks.

```
   10 REM *** PROGRAM VIII ***
   20 MODE 6
   30 asterisk$="*"
   40 FOR loop%=0 TO 10
   50 PRINT TAB(10-loop%,loop%)
asterisk$
   60 asterisk$=asterisk$+"**"
   70 NEXT loop%
```

Can you work out what's happening? Why add two asterisks in line 60?

Once you've "cracked" it you can try to turn this triangle upside down, as well.

```
* * * * *
* *   * *
*   *   *
* *   * *
* * * * *
```

Figure II

```
*
* *
* * *
* * * *
```

Figure IIIa

```
      *
    * *
  * * *
* * * *
```

Figure IIIb

WATFORD ELECTRONICS

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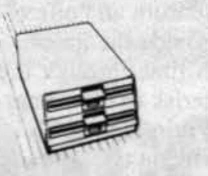

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● **CS100 – TEAC** Cased with own Power Supply, S/S 40 track, 5¼", 100K	**£180**
● **CD200 – TEAC** Twin Cased with own PSU, S/S, 40 track, 5¼", 200K	**£350**
● **CS200 – TEAC** Single Cased with own PSU, S/S, 80 track, 5¼", 200K	**£250**
● **CD400 – TEAC** Twin Cased with own PSU, S/S, 80 track, 5¼", 400K	**£475**
● **CS400 – TEAC** Single Cased with own PSU, D/S, 80 track, 5¼", 400K	**£310**
● **CD800 – TEAC** Twin Cased with own PSU, D/S, 80 track, 5¼", 800K	**£599**
● **MITSUBISHI** Slimline – Uncased, double density. Double track, 5¼", 1 Megabytes, track density 96TPI, track to track access time 3mSec. Plugs directly to BBC Micro.	ONLY **£220**
● **SINGLE MITSUBISHI** Slimline – Cased with own PSU, DS/DD, 1 Megabytes. (400K with BBC)	**£275**
● **TWIN MITSUBISHI** Slimline Cased with own PSU, DS/DD, 2 Megabytes. (800K with BBC)	**£535**
● Single Drive Cable for BBC Micro	**£7**
● Twin Drive Cable for BBC Micro	**£10**
● **Dual SWITCHABLE DRIVES,** 40/80, 400K. Cased with own PSU, Slimline	**£495**

5¼" DISKETTES

5 year warranty	
● 10 Verbatim or 3M Diskettes, 5¼", S/S	**£20**
● 10 Verbatim or 3M Diskettes, 5¼", D/S	**£30**
2 year warranty	
● 10 WABASH Diskettes, 5¼", S/S	**£15**
● 10 WABASH Diskettes, 5¼", D/S	**£25**
● Carriage on Drives	**£7**

DISC ALBUMS

Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 discs in double-sided clear view pockets. ONLY **£4.95**

PLASTIC LIBRARY CASES

for Disc Storage 5¼" (holds 10) **£2**

BBC PRINTER GP100A

10" Tractor Feed, 80 columns, 30CPS Normal & Double width Char, Dot res graphics. Parallel Interface standard.

ONLY **£165** (£7 carr.)

INTERFACE CABLE

BBC to Seikosha Cable **£10.00**

DUST COVER for GP100 £3.95

FRICTION FEED

Attachment for GP100A or 250X Printers **£22**

● Spare RIBBON for GP80	**£4.50**
● Spare RIBBON for GP100	**£4.95**
● Spare RIBBON for GP250	**£5.95**

GP-700 Colour Printer **Screen-dump** routine in **ROM FOR BBC** Micro **£12**

ONE STOP SHOP

Epson RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Graphics. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY **£239** (£7 carr.)

RX80 F/T PRINTER

As above but has both Friction and Tractor Feed. **£269**

Epson FX80 Printer

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY £369 (£7 carr.)

	Ribbons	**Dust Cover**
MX80FT	**£4.75**	**£4.50**
MX100	**£10.00**	**£5.25**
FX80	**£4.75**	**£4.95**
RX80	**£4.75**	**£4.50**

PRINTER INTERFACE BUFFER

When your system tries to serve you well but its efforts are frustrated by slow printers delaying from returning to more productive tasks then this is where our Printer Buffer Interface comes to your rescue. Available in 16K or 48K memory sizes. Simply connect the integral cables to your Micro and the Printer and switch on. The free standing compact unit (130x 135x40mm) is supplied complete with interface cables, a power supply and a comprehensive manual.

Price: (16K) **£120**
Price: (48K) **£149**

BROTHER HR-15

DAISY-WHEEL PRINTER

An exceptionally high quality daisy wheel printer at the price of a dot matrix printer. 18CPS; bi-directional, 3K of buffer; has clear buffer facility, carriage skip movement, proportional spacing; underlining; bold print and shadow print. Prints in two colours; super and subscript facility. Impact control facility to vary pressure on paper for making carbon copies. Has Centronics parallel or RS-232 interface. Connects directly to BBC Micro. A ribbon cassette plus a separate red ribbon. Optional extras: single sheet feeder takes up to 150 A4 sheets; a keyboard that transforms HR15 into a sophisticated electronics typewriter. Attractively finished in beige.

Special Introductory Offer

ONLY **£375**

Single Sheet Feeder **£199**

SPECIAL ★ XMAS OFFER ★

Cumana CS100 Drive	~~£180~~	£165
Cumana CS400 Drive	~~£310~~	£275
Cumana CD800 Drive	~~£599~~	£530
Seikosha GP100A PRINTER....................	~~£170~~	£155
Seikosha GP250X PRINTER....................	~~£225~~	£199
Epson FX80 PRINTER.....	~~£369~~	£349

LISTING PAPER

8½" or 9½" Fanfold paper plain or ruled (1000 sheets)	**£7** (£1.50p carr.)
15" Fanfold paper (1000 sheets)	**£9** (£1.50p carr.)
Teleprinter Roll (econo paper)	**£4** (£1.50p carr.)

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, etc., Printers.

ONLY £10

Special Extra long (60") Cable **£14**

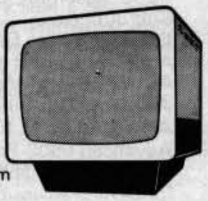
BBC Micro WORD-PROCESSING PACKAGE

A complete word processing package consisting of: BBC Model B, Zenith 12″ Green Monitor, Twin 200K highly reliable (1 year warranty) Twin Cased Disc Drives with own power supply, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother HR15 Daisy Wheel Printer, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software discs, 10 blank diskettes, 500 sheets of fan-fold paper. Manuals and all the leads.
All you require is a mains power point to have it up and running (we even supply the 4 way mains trailing socket).

ONLY **£1,350** (carr. £15)

(P.S. We will alter the package to suit your particular requirement. Call in for a demonstration.)

MONITORS



MICROVITEC 1431
14″ Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **£215** (carr. £7)

- **KAGA RGB** 12″ Medium Resolution Colour **£219** (Carr. £7)
- **KAGA RGB** 12″ High Resolution Colour **£259**(carr. £7)
- **BNC** Connecting Lead **£3**
- **RGB** Connecting Lead **£5**
- **ZENITH 12″** Green Monitor Hi-resolution **£75** (£7 carr.)
- **MICROVITEC 1451** Hi-res 14″ Monitor incl. lead **£319**
- **NEW MICROVITEC 14″** Colour Monitor/Composite Video **£249**

DATA RECORDER & ACCESSORIES

Top quality Slimline, portable Data Recorder for computer use. Mains/Battery, operated with counter	**£24.00**
DATA RECORDER CABLE For our Data Recorder to BBC Micro	**£2.50**
DATA CASSETTES Top grade C12 Data Cassettes in library cases.	**40p**
STACK PACK The unique Cassettes drawer rack system including 10 off C12 Data Cassettes	**£6**

BEEBPLOTTER

The Unique Graphic Tablet

Watford Electronics' BEEBPLOTTER will work with 32K BBC Micro. Connects to Analogue port. The unique design makes it accurate and simple to use. Attractively finished. The comprehensive booklet supplied describes its use in detail and shows some of the possible applications.

The special features include:-

- Works in all graphics mode and any colour selectable.
- Commands printed on Tablet and On-screen instructions.
- Special routines enable pictures to be quickly loaded from tape.
- Works with all operating systems and ECONET. Tape and Disc versions available.
- Large drawing area (32cms x 23cms).
- Maps, Pictures and Diagrams produced quickly and easily.
- Transparent tablet enables maps and diagrams to be copied directly from books.
- Commands include line, circles and rectangle drawings, infilling, full editing and an easy to use copy and move feature.
- Screen dump routines included for Seikosha and EPSON printers.
- Routines are included to allow user to incorporate pictures in their own programs.
- Designed by a professional teacher with educational uses in mind.

ONLY **£80** (£3 carr.)

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 pin DIN)	**30p**	**45p**
RS423 (5 pin Domino)	**30p**	**40p**
Cassette (7 pin DIN)	**25p**	**65p**
ECONET (5 pin DIN)	**15p**	**25p**
Paddles (15 pin 'D')	**£1.10**	**£2.15**
Disc to BBC Power Plug 6 pin	**70p**	-
Disc Drive Power Plug 4 pin	**60p**	-

READY-MADE LEADS for BBC

CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
Monitor Lead, BNC to PHONO	**£3.00**

Disc Drive to BBC Micro Power Lead
Single: **£3.00** Dual **£3.75**

★ SPECIAL XMAS OFFER ★

Microvitec 1431 Med res. 14″ MONITOR................	~~£225~~	**£209**
Microvitec 1451 Hi-res 14″ MONITOR................	~~£370~~	**£319**
KAGA I MONITOR RGB........................	~~£219~~	**£205**

13 ROM SOCKET BOARD

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 4 solder connections to be made. Full instructions are supplied.

Our 13 ROM SOCKETS BOARD enables the **User to increase the Sideways ROM capacity** the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User tne ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)
The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.
All essential lines are buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY **£29.95** (carr. £1)

– NEW LAUNCH –

Z80A WITH CP/M 2nd PROCESSOR BOARD

Plus Double Density Interface for BBC MICRO

Yes it's here, our Z80A 4MHz 2nd processor board with 64K memory, 4K monitor EPROM, parallel printer interface, CP/M based, double density board will handle, 3½″, 5¼″ and 8″ floppy disc drives and many more facilities. All neatly housed in a twin slimline disc drive case.

ONLY **£399**

Call in at our stand at The BBC Micro User Show for a demonstration.

EPROM for the BBC MICRO & 13 ROM SOCKET BOARD

	1+	25+
2764-250nS	**£4.20**	**£3.75**
27128-250nS	**£18**	**£13**
27128-400nS	**£16**	**£14**
8271	**£36**	

CMOS RAM for the 13 ROM SOCKET Board

6116-150nS (2K)	**£3.40**
6264-150nS (8K)	**£26.00**

EPROM PROGRAMMER for BBC MICRO

At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2716 — 2516 — 2532 — 2564 — 2764 — 27128.**
This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

- **COMPLETELY SELF CONTAINED –** Housed in its own sturdy case – Uses its own power supply – connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT –** Comes complete with simple to use fully machine code ROM based software and easy to understand manual. Facilities include Varification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does not simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE –** Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 TUBE and PRESTEL Adaptors without having to disconnect everything.
- Allows more than one program to reside in an EPROM using the ROM Filing System.

ONLY **£89** incl. Manual (£3 carr)

BEEBMON

A ROM based machine code Monitor for BBC Micro. It enables machine code programs to be debugged and altered easily and quickly. Being a ROM, its commands are always readily available and occupy no user memory. Appears to take no base page and only one page of relocatable workspace (256 bytes) and no more anywhere in RAM. Beebmon can do more than any other machine code monitors currently on the market. The special features include facilities like: TABULATE, MODIFY, FILL, COPY, COMPARE, SEARCH (HEX & ASCII) CHEKSUM, DISASSEMBLE, RE-LOCATE and by Emulating the 6502 processor, SINGLE STEP, BREAK POINTS ON READ/WRITE/EXECUTE OF LOCATION also BREAK POINTS ON A, X & Y REGISTERS are provided. HAS WINDOWS INTO MEMORY & TEST WINDOWS. All this and more for only: **£25**

BBC LIGHT PEN KIT

All parts available as per Acorn User's 'SHINE A LIGHT' Light Pen article.

Kit Price: **£8.95**

BBC LIGHT PEN

A ready-made Light Pen for BBC Micro. Enables you to produce drawings on your own TV/MONITOR screen. Supplied complete with Software Cassette and instructions.

ONLY: £17

WATFORD ELECTRONICS

Continued →

★ THE ULTIMATE ★ BBC MICRO DFS

by Watford Electronics

High acclaimed at the Acorn User Show.
What do the independent press say?

Good value for money – *Beebug Aug. '83*
A very worthwhile package – *The Micro User*
You'll be buying a very powerful package – *Personal Computer News*
Superior DFS; Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

* The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

* A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

* A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

* A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.

* A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.

* A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

* When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

* Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.

* An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

* RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.

* OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.

* 2K of RAM can be reclaimed from the DFS by setting "PAGE" to & 1100.

Now with extra features:

* The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.

* Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as £1100 under most circumstances.

* To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO *A* gives information on all files in the current directory which have an "A" anywhere at all in their filename.

Continued:

* Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

* Fully compatible with BBC TELETEX and TORCH Systems

DFS ROM only **£39**
Complete Disc Interface including our highly sophisticated DFS ROM and fitting instructions **£85**
Comprehensive and clearly written DFS MANUAL. (P.S. This manual will only be sold to those who purchase our DFS.) **£7.50** (no VAT)

P.S.
We will exchange your existing ACORN DFS or AMCOM (PACE) DFS for the highly superior Watford's DFS ROM for **£35**

DISC DOCTOR **£26**

A sophisticated Disc Utility ROM with many useful commands. (For detail description please refer to Computer Concept's advert in this magazine.)

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL XMAS OFFER: only £33

BEEBFONT ROM

A new concept in BBC Software from Watford. This is a character FONT ROM that gives you 5 16x16 predefined FONT. The ROM is ideal for high quality demonstration on screen and when used in conjunction with EPSON printer, allows printing of letters etc., in mixed type faces. Now with BEEBFONT in your BBC you can write letters to your European friends with the correct alphabet. The package is complete, including an Editor to design your own fonts and several spare fonts which could not be fitted in the ROM. Can still be run from RAM. Supplied complete with ROM, software on disc/tape and manual.

Price: **£45**

DISASSEMBLER
Will generate fully labelled assembly listings of any machine code program. Data is automatically differentiated from code and displayed together with its ASCII equivalent. Assembly listing can be saved in *EXEC format and subsequently incorporated into user programs.

Cassette: **£6.95**
Disk: **£8.95**

EMULATOR
An extremely powerful and flexible machine code interpreter. Allows you to write and debug machine code as easily as BASIC. Features single step, breakpoint register display, edit modes, etc.

Cassette: **7.25**
Disk: **£9.25**

VIEW Acorn soft's Wordprocessor ROM. **£52**

FORTH ROM for BBC

This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Manual included. **£36**

ONLY THE BEST AT WATFORD

ACCESS ORDERS BY TELEPHONE
Simply phone your order through. We do the rest
(0923) 50234)

GEMINI'S BUSINESS SOFTWAR

Written by Professionals.

Cashbook Accounts	£52
Final Accounts	£52
Invoices & Statements	£17.25
Commercial Accounts	£17.25
Mailing List	£17.25
Database	£17.25
Stock Control	£17.25
Home Accounts	£17.25
Beebcalc Spreadsheet Analysis	£17.25
Beebplot	£17.25

N.B. All the above Gemini software is on tape. For Disc Based (40/80 track) please add £3.

BOOKS (No VAT on Books)

30 Programs – BBC Micro	£4.95
30 Hour BASIC (BBC Micro)	£6.00
36 Challenging Games for BBC Micro	£5.95
100 Programs for BBC Micro	£6.95
Cassette version of above	£10
6502 Application Book	£10.25
6502 Assembly Lang. Programming	£12.50
6502 Assembly Lang. Subroutines	£11.80
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
ACORN ATOM Magic Book	£5.50
Advance User Guide for BBC	£13.50
Advanced 6502 Interfacing	£10.95
Advanced 6502 Programming	£10.50
Assembly Lang. Programming for BBC	£8.95
Advanced Programming Techniques for the	
BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC Micro	£7.40
BBC Forth	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£6.95
Easyprogramming for BBC Micro	£5.95
BBC Micro Graphics and Sound	£6.95
BBC Micro **ROM PAGING** System Explained	£2.95
BBC Micro Revealed	£7.95
BBC Micro Instant Machine Code including Software Cassette	£34.00
Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative Graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
Discover BBC Machine Code	£6.95
Discover FORTH – Osborne	£11.25
Easy Prog. for BBC Micro	£6.50
35 Educational Programs for BBC Micro	£6.95
Further Prog. for BBC Micro	£6.90
FORTH Programming (Sams)	£12.50
Functional Forth for the BBC Micro	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer can Play	£6.95
Getting Acquainted/Acorn ATOM	£7.95
Graphs & Charts on BBC Micro	£7.50
Intro to Micro Beginners Book (3 Ed.)	£9.90
Introducing the BBC Micro	£5.95
LISP	£9.25
Logo Programming	£8.95
Micros in the Classroom	£4.90
Practical Prog. for BBC & ATOM	£5.95
Programming the 6502	£10.75
Programming the BBC Micro	£6.95
PASCAL	£9.25
Mastering VISICALC (Sybex)	£11.95
Structured Prog. with BBC BASIC	£9.50
The BBC Micro Book, BASIC, SOUND & GRAPHICS	£7.40
BBC Micro Assembly Lang. Prog.	£7.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
Graphic Art for BBC Computer	£5.95
Graphs and Charts (Cassette)	£8.95
Graphics on BBC Micro	£6.95
Programing for Education on BBC	£5.95
Using Floppy Discs with BBC Micro	£5.95

NEW DISC-FIX ROM

This ROM is an integrated, menu-driven DISC MAINTENANCE PACKAGE. Using simple menu selections, with intelligible prompts for any input required, the user can recover data from damaged discs. Facilities include:-

- Full screen editing of sectors on the disc.
- Sectors can be found by file name or sector number.
- Files and sectors can quickly and easily be dumped to a printer for examination and possible subsequent modification.
- COPY; blocks of data can be copied from any point on the disc to any other point. Blocks can be as small as one byte and can be transferred anywhere in a sector.
- SEARCH: The disc can be searched for any string, starting and finishing at any designated sector.
- VERIFY: Any block of sectors can be checked for their validity.
- FORMAT: Any track or group of tracks can be individually formatted to Acorn or Watford DFS standard.
- INSERT: Allows the manual creation of new directory entries to allow "undeletion" of files.
- BACKUP: This is similar to normal DFS backup but allows recovery after a disc error.

Completely compatible with both Acorn and Watford Disc Filing Systems. Instruction manual supplied.

Price **£19.00**

TINY PASCAL (in 16K ROM)

PASCAL-T is capable of compiling source PASCAL into a compact very fast threaded-interpreters-code. Full editor and disc support are included. Comprehensive documentation supplied **£59**

EDUCATION Software

JUNIOR MATHS PACK (32K) £6.95
Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

MATHS TRANSLATIONS £5.50
This package explains how to translate Triangles and Quadrilaterals, moving these geometrical shapes on a grid. It goes step by step through the concepts and the matrix calculations involved. Excellent software.

WORLD GEOGRAPHY (32K) £7.00
Beautifully drawn Hi-Res colour map of the world illustrates and aids this graded series of tests on capital cities and populations of the world.

WORDHANG £7.80
(Age 7-13). A word guessing program based on the well known Hangman game. Uses full colour graphics. Complete with 260 words and the facility save your own list of words.

WORLDWISE £7.80
(Age 7-15. Two constructive geography programs allowing children to build detailed data bases covering both the UK and the world. Encourages children to refer to atlas and reference books. Save the database anytime.

ANIMAL/VEGETABLE/MINERAL £4.95
(Age 7-13). Provides an opportunity for children to teach the computer to differentiate between objects. The program tries to guess the object the child has thought of, using personalised responses like Mmm ... I am thinking.

BRITISH GEOGRAPHY £6.95
Teaches a child the locations of Cities and Ports using directional keys.

CAROUSEL £5.50
Aimed at junior school age. Sequences of colours and sounds teaches a child to concentrate.

HAPPY NUMBERS £7.80
(Age 4-6). No reading skills are required to use this colour graphics number recognition and counting program. Children build patterns of flowers corresponding to figures, quickly learning their significance.

INTRO TO ARITHMETIC £10.45
4 programs – Additions, subtractions, multiplications and divisions. Help stage, moving graphics and colours. Worksheet produced at the end of program. (5-7 years old).

BBC JOYSTICKS

Two versions available:

SINGLE: Player type	**£7.00** each
TWO Players type	**£11.50** per pair

VOLTMACE'S DELTA 14 Hand-set

Highly acclaimed at the Acorn User Show. This handset set is very reliable and versatile. For further details please see VOLTMACE's advert in this magazine.

Price:		
'Delta 14' Hand set		£11.25
ADAPTOR MODULE		£11.95
TRANSFER PROGRAM	Tape	£5.15
	Disc	£7.75

SURGE PROTECTOR Plug

Safely eliminates dangerous voltage surges. During a thunderstorm, a nearby lightning strike can induce high voltage spikes in the voltage supply or fluctuating loads can also result in transient overvoltages which if unchecked, lead to expensive data corruption/loss. Our surge protection plug will provide the necessary surge protection. Simply replace your standard 13Amp mains plug with the surge protection plug (which is almost the same size). Ideal for computers, Hi-Fi systems, precision instruments, fridge freezers, etc. Max. surge current 2KAmp; Max. Voltage 250 Volts.

Price: **£9**

PLINTH FOR BBC MICRO

Protect your micro from the weight of the heavy TV/Monitor. This sturdy plinth is attractively finished in BBC colour. It can be used to support a monitor or a printer. The micro slides underneath comfortably. A must for every BBC Micro owner, specially for those who have to move/open their computer frequently.

Price: £10 (carr. £1.50)

PLINTH FOR PRINTERS

Keeps your desk tidy. Place the printer on the plinth and the paper underneath. Finished in BBC colour.

£10 (carr. £1.50)

BEEB SPEECH SYNTHESISER

Simply the best!

Watford's very own speech system, specially designed so that even a novice can make his BBC talk.
PHONEMES for word synthesis allows unlimited vocabulary. Software in ROM supplied with the unit. The system is built in a small plastic box. Very compact. Connects directly to the user port.

Price including Manual: **£39**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility, designed for the BBC Micro, which allows you to transfer almost all of your tape software to disc. It will handle 'Locked' programs and allows you to load full length adventure type programs (i.e. up to &6E blocks) from disc in seconds rather than minutes.

Price: **£12**

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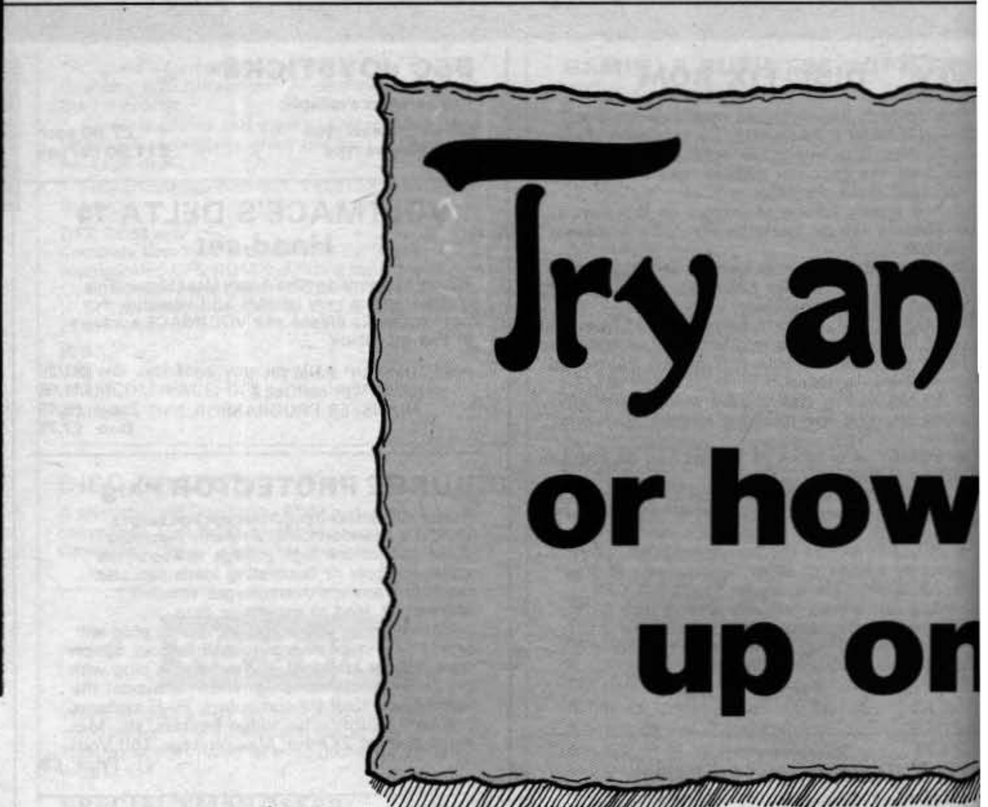
The first adventure – *Colossal Cave* – was written by two Americans, Crowther and Woods, about eight years ago. If they could have patented the idea they would be millionaires.

Now there are literally dozens of adventures available on the BBC Micro with the original, classic Colossal Cave released recently in an expanded version.

I tried six of them and, in order to give a fair review I (eventually) cheated in every one of them.



Try an or how up on

Sphinx Adventure *Acornsoft*

BASED very much on Colossal Cave, you start at the end of a road outside a building.

However inside the building there are only a lamp and keys (no bottle, no food) so old stagers had better get ready to draw a new map and to meet some new characters.

You have to collect about the same number of treasures and, yet again, there is a pesky pirate who takes things from you.

Funny thing is that he doesn't pop up unexpectedly like he used to, and now he only takes one thing at a time.

Looking at the listing I was surprised to find that he won't grab your sapphires but will take the bottle which is essential for you to make much further progress.

So first of all you have to learn how to bypass the pirate and then how to cross the chasm. Having done that you get lumbered with a rabbit who follows you everywhere.

He seems harmless enough, but you'll have to get rid of him in order to pass another obstacle.

And so it goes on and, even with a listing, it's going to take a long time to solve this adventure because there are 143 locations, or "rooms", to visit and quite a long maze to sort out before you reach the Sphinx and can deposit your collection of treasures.

A big drawback is that you can't SAVE a position, so whenever you get stuck or killed you have to start from the beginning again and be very patient and careful as you clear out the part of the puzzle which you have already solved.

You have to be patient because the messages don't come up immediately as you move around.

The reason the program is slow is that it decodes your commands such as verb object – GET LAMP, DROP BOTTLE – and describes your surroundings using RESTOREs on DATA.

This obviously saves space in the program because when you reach a location L then RESTORE L neatly points to a description of where you are. But it is a slow technique.

As I said before, Sphinx is very similar to Colossal Cave in atmosphere and content. So if you want a more whimsical British type of humour you could try:

Philosopher's Quest *Acornsoft*

I SAY this one is whimsical because in this adventure you are unlikely to be torn limb from limb or have axes thrown at you.

Indeed you are encouraged to throw a few things yourself. But if you over-indulge then you get turned into a lettuce leaf.

Another bit of whimsy is that you have to get a cup of tea to a dear old lady otherwise she keeps dying.

There are nearly 300 messages and about 50 locations, plus sundry mazes. One of these is random, so the usual way of mapping a maze won't work in this case.

The idea is to locate a number of treasures and return them to the starting point to score a maximum of 250 points.

On your travels you encounter various problems, like being swallowed by an enormous whale – in which case you can try what Pinochio did – and being trampled by elephants.

This adventure encourages a certain use of logic and there are hidden clues in the messages. This is different to Colossal Cave, where it is almost impossible to solve many of the problems other than by trial and error or a peek at the listing.

So when you are told that you meet a sad looking octopus there is a reason for its misery.

A nice feature is that you can SAVE your position in this game and this only takes about 30 seconds on a cassette tape.

This program came out in 1982 and was used to set up another adventure, with a different map, problems and messages, which came out in early 1983 as . . .

The Castle of Riddles *Acornsoft*

THIS puzzle was hyped by offering a prize to the first person to solve it. I believe the winner cracked the puzzle in less than a day and went round personally with the answer.

A bit unfair to those of us who live

Adventure to get one the kids

outside London, so if Acornsoft want to use that promotion again they will have to set up a telephone answering machine.

I bought it, listed it and then – foolishly – completely solved it before sending in the answer. You actually know the answer long before the end, but I suspected a trick that the third and fourth riddles might be switched.

Anyway, enough griping. If you like riddles and logical problems then this one should appeal. The advantage you have over your kids is that "Richard of York gave battle in vain" should mean more to you than a 10-year-old wizard at Space Invaders.

The castle has a similar number of locations to Philosopher's Quest, plus the added interest – if you are competitive – that someone solved it in about 24 hours. So you can get some idea of how good you have to be to win competitions of this kind.

Incidentally, and digressing, have Acornsoft thought of the foreign market for these programs? It's not too difficult to translate the verbs, objects and messages into, say, French. But the Castle of Riddles would present certain semantic problems. Just a thought – which I can't patent, so no charge.

So far I have only discussed Acornsoft products, and one year old ones at that, so you would expect more recent adventures to be, if not better than the classics, then a bit different.

However the "traditional" style is still very popular as evidenced by . . .

Old Father Time *Bug Byte*

ONE improvement here is that you can, and have to, be more precise in what you command. The old verb, object, commands are not sufficient to solve this puzzle. The example given is *Put apple on table.*

Bug Byte also invite anybody who thinks they can write a better adventure than this to get in touch with them. I suspect that this program came from just such a source.

To be fair, I did try all the adventures before looking at the listings and, Old Father Time does not give a separate sheet of hints, like Acornsoft, because "all necessary clues are in the program". This is quite true, in fact, you can't stop it giving you rather more clues than you really need. For example, you are told not to drop things, but you find that out soon enough.

Experienced adventurers will have little trouble finding the key or the lamp in this one because such people dig up everywhere as a matter of course.

The program has a very quick SAVE, which means there can't be many rooms or objects in it. This encourages the solver to try quite risky moves, unlike the Sphinx, where one mistake is fatal, and Colossal Cave, where you had to wait about half an hour before you could try again.

When I did list the program I had more difficulty trying to sort out the map than I had done when actually playing it.

There are about 20 important rooms in it, but some simple tricks make it appear a lot bigger and the way you move around is not via a two – dimensional array of *(rooms)* X *(directions)* with dependencies on whether you have a "key" or say the correct word.

The program is totally unstructured, with IF . . . THEN . . . RETURN/GOTO almost everywhere – literally hundreds of them. Edsgar Dijkstra was quite right, it's impossible to sort out what's going on! It's easier to solve this game by playing it fairly.

Now I know that unstructured programs like this *must* have bugs in them because it is impossible for the author to verify the performance. I did find one – try GET DIAMONDS before you have the lamp.

Another of the new adventures is . . .

Circus *Digital Fantasia*

THIS is one of a series of 10 adventures by Brian Howarth and I was immediately thrown by the split screen.

The top tells you where you are and what you can see and the bottom 5/6 scrolls your commands and the program's replies.

If you are going to split the screen then the natural place for the fixed messages is at the bottom, not the top.

Anyway, having solved the puzzle of

→

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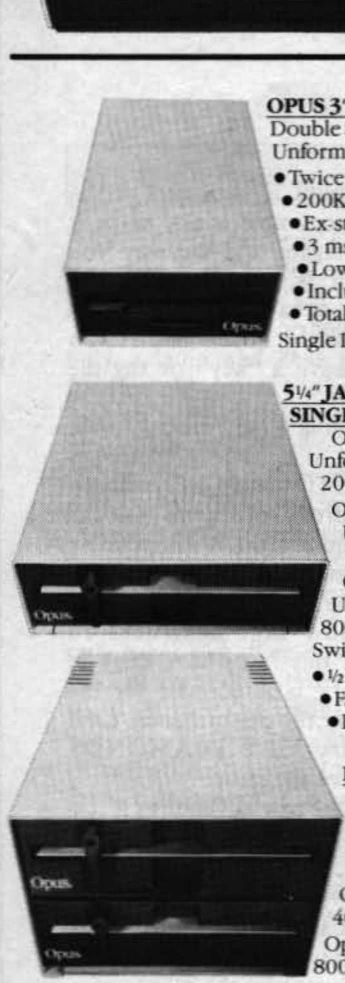

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BUS

From Page 41

where the messages were, I had a lot of trouble playing fair because you have to get some light in the circus tent, and I thought you might do this by mending the generator.

Consequently I dug everywhere with the shovel – which this program treats like a spade – and even inside the car. But I couldn't find anything useful.

I gave up and tried to get a listing but – tricky – it's in assembler.

So the next move was to isolate the printing characters and get the messages. These can be very laconic, such as *You are on a trapeze,* and objects like *boot, trunk,* and – eureka – *flashlight.*

So back to running it and trying to OPEN GLOVE compartment in the car – no luck – and then digging everywhere again.

I had cultivated the outside of the tent so thoroughly that I really needed boots to get around. Anyway I did eventually find the flashlight.

The only help you get from this program is to be told to EXAMine things. All I can say is that if you drive a Volkswagen you ain't never gonna find that flashlight.

Once inside the tent your flashlight reveals an enormous circus ring where you can walk a tightrope, tame a tiger, swing on a trapeze and be shot from a cannon. All these lead up to the revelation of what you really have to do.

The program is very similar to Scott Adams' original series of adventures published in 1980 in that it's a standard program manipulating a different set of rooms (there are 35 of them), objects and short messages.

The advantage for the author is that he can mass produce his adventures, but the drawback is that he cannot introduce much humour or variety, and the result is that all his efforts must be very similar in atmosphere and method of solution.

The last of the new adventures is so dreadful that it could be used as an example of how not to write any program. It is . . .

The grange — *Dobsoft*

IN this one you have a guide, called Dob, who shows you round his "dump of a school" in which you have to find a number of cream buns and return them to the headmistress's office. In the process you will be set some really tricky problems like "Where did the Norman fleet anchor in 1066?" and "To which Phylum does the roundworm Ascaris belong?"

The toughest problem is getting past a prefect at the beginning. As you emerge, fully armed, from a cupboard he stops you and you have four choices of what to do to get past him A,B,C or D (no, you can't shoot him) where

```
A$=GET$: PRE$=CHR$(
  RND(3)+65):
IF A$=PRE$ THEN
  rightchoice
```

If you guess wrong then you get an advert about other Dobsoft products and the program stops – it takes eight minutes to load it in again to try another random number.

Of course I could have copied it to disc for a fast restart, but that would be illegal.

There are 27 rooms in this game and it took me quite a while to sort out how the program moves you from one location to another.

Very briefly, if you say WEST it READs a DATA list, matches the word WEST and then takes the next number in the DATA list (4).

It then scans another DATA list related to the room you are in, finds a 4 and takes the next number as the next room.

The whole program is a similar dog's spaghetti dinner, and crawls with bugs. Don't try to EAT BEANS in the whitewashed room else you go into an infinite loop and have to break the program and reload.

That wouldn't be too bad except that you have to play Russian roulette with that prefect again.

All in all, it's an atrocious program, seemingly written by a self educated teenage "genius" and I found it quite fascinating trying to unravel its ghastly innards.

You are actually expected to EXAMine things that you haven't been told about and, as I said before, if you want to know how not to design or write an adventure then I seriously recommend this one.

This was my overall impression of the six programs programs I reviewed:

One of the skills of writing an adventure is to cram as much as possible into the program, so I have never seen much point in having the program respond to four letter words – that is until we get porno adventures.

All the last three programs reviewed above wasted space in this way when it would have been better, and more accurate, if they replied I DON'T UNDERSTAND to such input.

Acornsoft, probably under the influence of Auntie BBC, don't recognise swearing and quite right. After all, you're dealing with a dear old lady in Philosopher's Quest.

Apart from this distinction, how does one rate or compare these and other adventures?

Not just by how long it takes to solve them because then you penalise programs that give you a SAVE facility and promote programs like The Grange that depend on sheer luck.

Nevertheless if you are going to spend £10 I think you should expect at least 10 hours sorting out the problems, in which case I think Old Father Time is a bit too easy to get through for experienced players.

The Circus is also fairly easy to crack, particularly if you've already bought one of the 10 games in this series.

Overall, I thought the Acornsoft games were more than twice as good as the new ones, with Philosopher's Quest the best of the bunch.

Although Acornsoft seem to have a common author and program, the situations are far more complex, amusing and inventive than the more recent offerings from other software houses.

As for Dobsoft's The Grange – once was enough. Any more and I think the author will have to sit in the corner and be condemned to playing them himself.

As a final point, I would be happier buying a new adventure if the manufacturer gave some indication of the minimum number of moves required for an expert solution.

Take the original Colossal Cave – it was possible to score the full 350 points in 167 moves, a fact that the authors probably didn't know.

This would not only indicate that the program had been tested, but would also add a further element of challenge to the puzzle solver.

A few years ago people delighted in writing to magazines saying that they could beat some micro-chess program in eight moves or so.

Maybe some readers would now like to write in telling us how many moves they have taken to solve a particular adventure.

Alice

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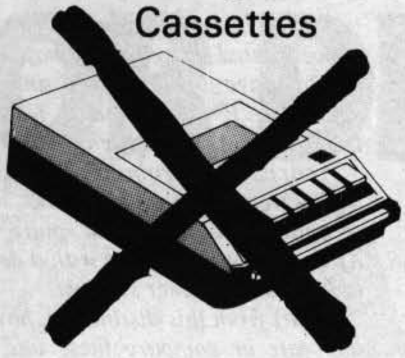

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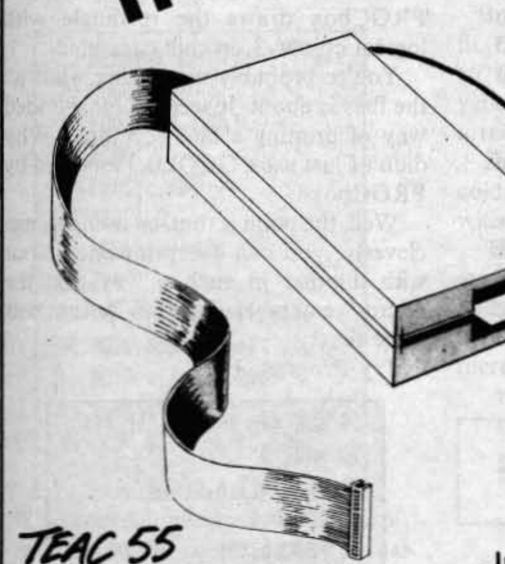

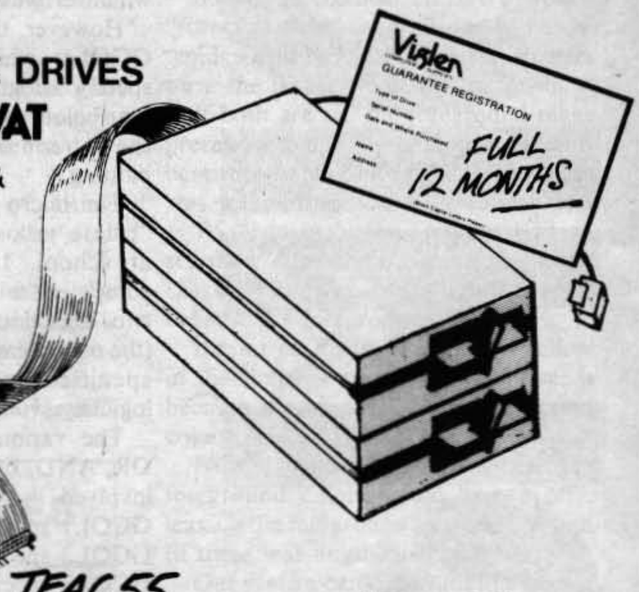

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GRAPHICS

Part 8

SO far we have used GCOL0 to choose our graphics colours. In fact, we've treated GCOL as if it always had a 0 after it. This isn't always so – we can follow GCOL directly with any numbers in the range 0 to 4.

When we use GCOL0, the colour specified by the following logical colour number is "forcibly painted" onto the micro's screen, completely overpainting whatever was below.

However, the other options, such as GCOL1, while still allowing you to specify a logical colour number, blend that colour with the colour already on the screen at the position you're plotting.

The micro doesn't work on the old "blue + yellow = green" rule we learnt at school. Instead, the colour the computer "mixes" depends on how the two logical colour numbers involved (the one already on the screen, and that specified in the GCOL) combine logically.

The various GCOL options either OR, AND, EOR or NOT the numbers involved.

GCOL1 specifies OR
GCOL2 specifies AND
GCOL3 specifies EOR
GCOL4 quite simply NOTs, or inverts, the colour at present on the screen, the logical colours you specify after the comma being a dummy.

Try Program I.

```
10 REM *** PROGRAM I ***
20 MODE 5
30 VDU 19,3,4,0,0,0
40 GCOL0,1
50 PROCbox(200)
60 A$=GET$
70 GCOL1,2
80 PROCbox(200)
90 END
100 DEF PROCbox(offset%)
110 MOVE 800+offset%,200
120 MOVE offset%,200
130 PLOT 85,800+offset%,800
140 PLOT 85,offset%,800
150 ENDPROC
```

Line 30 simply changes logical colour 3 to blue. Line 40 selects logical colour 1, in this case red, as foreground, while line 50 prints a red rectangle.

Line 60 holds the program until you press a key, then line 70 selects a new logical colour to reprint the box in.

Now it may look as if you're redrawing the box in logical colour 2, but notice you're using GCOL1,2 not GCOL0,2. The GCOL1 means that the BBC Micro will logically OR the present foreground colour with 2, and use the result as the foreground colour.

(If you're not sure what logically ORing something means, see this month's Bit and Bytes on Page 67.)

As the previous logical colour number was 1,

1 OR 2 gives 3

or, in the rather clearer binary,

%01 OR %10 gives %11

So, the second time it is called, PROCbox draws the rectangle with logical colour 3, in this case blue.

You're probably wondering what all the fuss is about. It seems a longwinded way of printing a blue rectangle. Why didn't I just use a GCOL0,3 followed by PROCbox?

Well, the point is that, by doing things cleverly, you can overprint one colour with another in such a way that the micro "remembers" the colour that was there first!

Try Program II.

```
10 REM *** PROGRAM II ***
20 MODE 5
30 VDU 19,3,4,0,0,0
40 GCOL0,1
50 PROCbox(0)
60 GCOL1,2
70 PROCbox(400)
80 END
90 DEF PROCbox(offset%)
100 MOVE 800+offset%,200
110 MOVE offset%,200
120 PLOT 85,800+offset%,800
130 PLOT 85,offset%,800
140 ENDPROC
```

Here we omit the pause before the second rectangle is drawn, and the two rectangles, though overlapping, are offset from each other.

Amazingly, three rectangles appear on the screen. Figure I should help to make this clearer.

What happens is that the first rectangle is drawn normally in red (GCOL0,1). The second rectangle is drawn with GCOL1,2. This ORs logical colour 2 with the logical colour numbers

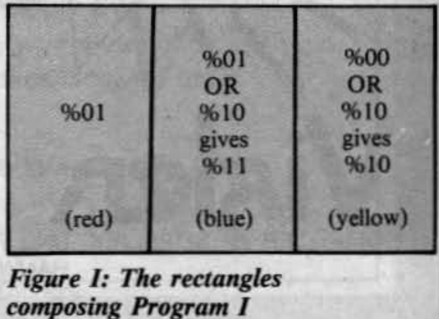

Figure I: The rectangles composing Program I

underneath where it happens to be plotting.

In this case, the second rectangle is spread over two colours – the red of the first rectangle (%01) and the black of the background (%00).

This gives two different rectangles since

%01 OR %10 gives %11 (blue)

and

%00 OR %10 gives %10 (yellow)

Program III is a variant of Program II.

```
 10 REM *** PROGRAM III ***
 20 MODE 5
 30 VDU 19,3,1,0,0,0
 40 GCOL1,1
 50 PROCbox(0)
 60 GCOL1,2
 70 PROCbox(400)
 80 END
 90 DEF PROCbox(offset%)
100 MOVE 800+offset%,200
110 MOVE offset%,200
120 PLOT 85,800+offset%,800
130 PLOT 85,offset%,800
140 ENDPROC
```

What we've done here is to use line 30 to redefine logical colour 3 to be actual colour 1 (red).

This means that there are now two logical colour numbers for red (%01 and %11).

Also, we're ORing the first rectangle onto the screen – line 40 uses a GCOL1,1. As it is going on the background (%00) this doesn't make any effective difference. For the rest of this article we're going to be ORing on rather than using GCOL0.

If you've run Program III you'll have noticed that we get two rectangles, red and yellow. The red actually comprises the old red and blue rectangles combined.

This is because the old blue rectangle is in colour %11 since we've ORed %01 with %10. As we've redefined that as red in line 30, the two rectangles merge into one red rectangle (actually consisting of two logical colour numbers).

One way to think about this arrangement is to imagine that the colour red is somehow "in front" of the colour yellow, so our original red rectangle blocks out or obscures the yellow rectangle where they overlap.

You can consider the red to be the "foreground colour" and the yellow a "midground colour". (We've already got a background.)

When you think like this, it's natural that the foreground should obscure the midground in this way.

When we think of logical colours as belonging to fore-, mid- and background we say we are dealing with "multi-plane images".

Think of each colour as being drawn on separate screens, or planes, one on top of the other. The one on top is the foreground colour, which will then obscure the mid- and background colours underneath.

In Program III, the red is drawn in the first plane and the yellow in the second, so the red overlaps the yellow – any yellow painted on the midplane "under" a red area will not show.

So, by using this system of ORing colours onto the screen, we can deal with overlapping images.

There's more to this than meets the eye. When you OR a foreground onto a midground colour, the micro "remembers" that there was a midground colour there. So, if the foreground "moves off" the midground colour shows through.

By PAUL JONES

You see, when you OR logical colour 2 with logical colour 1, the result is logical colour 3 which, with a cunning VDU 19, we arranged to be the foreground colour.

The situation is easier to follow in binary: %01 and %11 are both the foreground colour. Notice that bit zero is set – that is, equal to one – when we are talking about a foreground colour.

The other two colour numbers in a four colour mode, %00 and %10, which do not have this bit set, are the back- and midground colours respectively.

Now we are ORing the colours onto the graphics screen. So, the fact that bit one is set in %11 must mean that originally there was some yellow "underneath".

After all, if you're just ORing the three logical colours %00, %01 and %10 how else can bit one be set without having %10 in on the deal? (We never use %11 when ORing onto the screen since we already have %01 to do the job – they're the same colour.)

So we can consider bit zero to be the "foreground bit" and bit one to be the "midground bit". If either bit is set on its own, the respective colour is shown.

If both are set, the foreground takes precedence, but the computer remembers (by keeping bit one set) that there was yellow there.

To recap, in the last program, bit zero set shows that there's some red in the shape, and you're always bound to see it because it's foreground.

Bit one set means that there is yellow in the shape – even if you can't see it because it's obscured by a foreground colour. Figure II summarises this.

Now I hinted previously that the foreground colour could "move off", leaving the midground showing through (if there was anything there).

Our system can cope with this since it remembers when the foreground is obscuring the background.

You see, by using another GCOL statement, you can "turn off" or "clear to zero" the foreground colour bit in the logical colour number. After all, if you change %11 to %10, you'll be left with something in the midground colour.

We can "clear" bits like this with the AND statement. We just AND the number we're working on with another binary number consisting of 1s in the bits we want to preserve, and 0s in the bits we wish to clear.

So, to clear the foreground bit, we

→

Logical colour number		Interpretation
Binary	Decimal	
00	0	Background
01	1	Simple foreground
10	2	Simple midground
11	3	Foreground obscuring midground

Figure II: Multiplane images in a four colour mode

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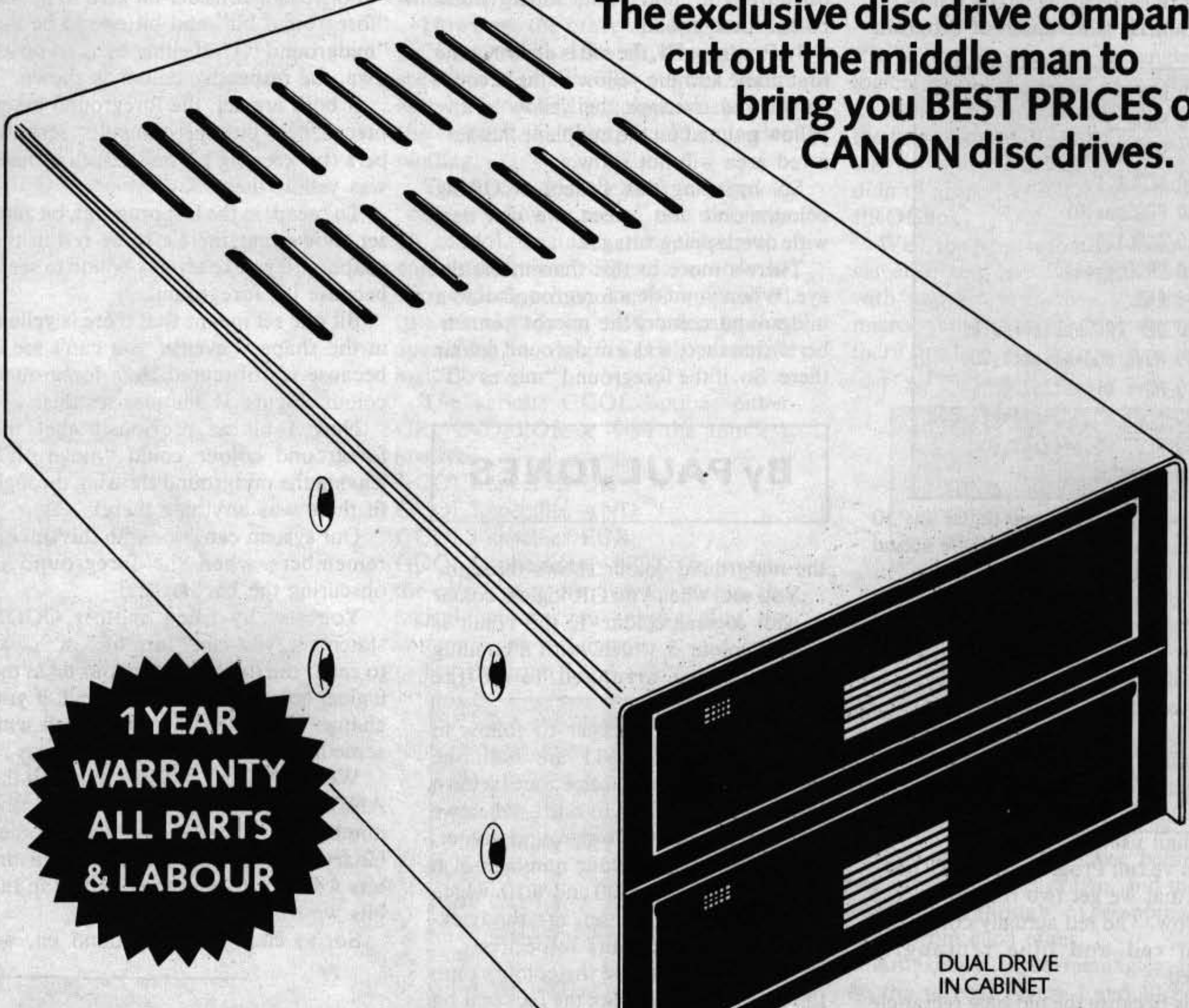

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From Page 47

want to AND the logical colour number with %10.

To show how this works, consider the case of a foreground colour obscuring a background colour. As we've seen, the logical colour number for this is %11.

Now %11 AND %10 gives %10 – that is, we've cleared the foreground bit leaving only the midground.

If there were no midground present – that is, if we had just a simple foreground (%01) – then %01 AND %10 gives %00, leaving just the background.

So, we can "turn off" the foreground by ANDing it with %10. GCOL2 allows us to do this sort of ANDing of logical colour numbers. It ANDs the logical colour number following it with that on the screen.

```
 10 REM *** PROGRAM IV ***
 20 MODE 5
 30 VDU 19,3,1,0,0,0
 40 GCOL1,1
 50 PROCbox(0)
 60 A$=GET$
 70 GCOL1,2
 80 PROCbox(400)
 90 A$=GET$
100 GCOL2,2
110 PROCbox(0)
120 END
130 DEF PROCbox(offset%)
140 MOVE 800+offset%,200
150 MOVE offset%,200
160 PLOT 85,800+offset%,800
170 PLOT 85,offset%,800
180 ENDPROC
```

Program IV is identical to Program III in that it draws a red foreground rectangle, partly obscuring a yellow midground rectangle.

However, in lines 100 and 110, we AND the foreground rectangle with %10, clearing the foreground bit. This effectively "unprints" the foreground rectangle, revealing the part of the midground rectangle previously obscured.

(If you remember, the obscured part was in logical colour %11, so ANDing with %10 leaves you with %10, the midground colour.)

Similarly, we can clear the midground colour. This time we AND the logical colour number with %01, the zero "killing" the required bit.

To demonstrate this, add these lines to Program IV:

```
100 GCOL2,1
110 PROCbox(400)
```

These changes ensure that we are ANDing the second rectangle with %01.

When you run it, the second rectangle disappears. Actually, the whole of the yellow midground rectangle goes – even though you can't see it behind the red foreground.

Also, the red foreground that previously overlapped the yellow is now totally in logical colour %01. Before it was %11 – now we've ANDed it with %01 to give %01.

So, as our scheme has developed, we

- *OR to put shapes on the screen*
- *AND to take shapes off the screen*

Although we have restricted ourselves to a four colour mode, this has given us three effective colours (one of which has two logical colour numbers), and the power to overlap and recover shapes.

Finally, we can use the ability to OR shapes to display two overlapping shapes separately and instantly on the same screen without overlapping them.

Program V shows how. As Figure III demonstrates, we simply OR the rectangle onto the triangle.

To display the triangle, we use VDU 19 statements to turn colours 2 and 3 "on" in the triangle colour, and to make colour 1 the background colour (PROCdisplay_triangle).

Similarly, to display the rectangle, we turn 3 and 1 "on" and set 2 to background (PROCdisplay_rectangle).

NEXT MONTH we'll be looking at some more GCOL techniques.

```
 10 REM *** PROGRAM V ***
 20 MODE 5
 30 VDU 19,3,1,0,0,0
 40 GCOL1,2:PROCtriangle(200):PROCwa
    it
 50 GCOL1,1:PROCbox(200):PROCwait
 60 REPEAT
 70 PROCdisplay_triangle:PROCwait
 80 PROCdisplay_box:PROCwait
 90 UNTIL FALSE
100 DEF PROCbox(offset%)
110 MOVE 800+offset%,200
120 MOVE offset%,200
130 PLOT 85,800+offset%,600
140 PLOT 85,offset%,600
150 ENDPROC
160 DEF PROCtriangle(offset%)
170  MOVE 800+offset%,200
180 MOVE offset%,200
190 PLOT 85,400+offset%,1000
200 ENDPROC
210 DEF PROCdisplay_box
220 VDU 19,1,1,0,0,0
230 VDU 19,2,0,0,0,0
240 VDU 19,3,1,0,0,0
250 ENDPROC
260 DEF PROCdisplay_triangle
270 VDU 19,1,0,0,0,0
280 VDU 19,2,3,0,0,0
290 VDU 19,3,3,0,0,0
300 ENDPROC
310 DEF PROCwait
320 FOR loop%=0 TO 2000
330 NEXT loop%
340 ENDPROC
```

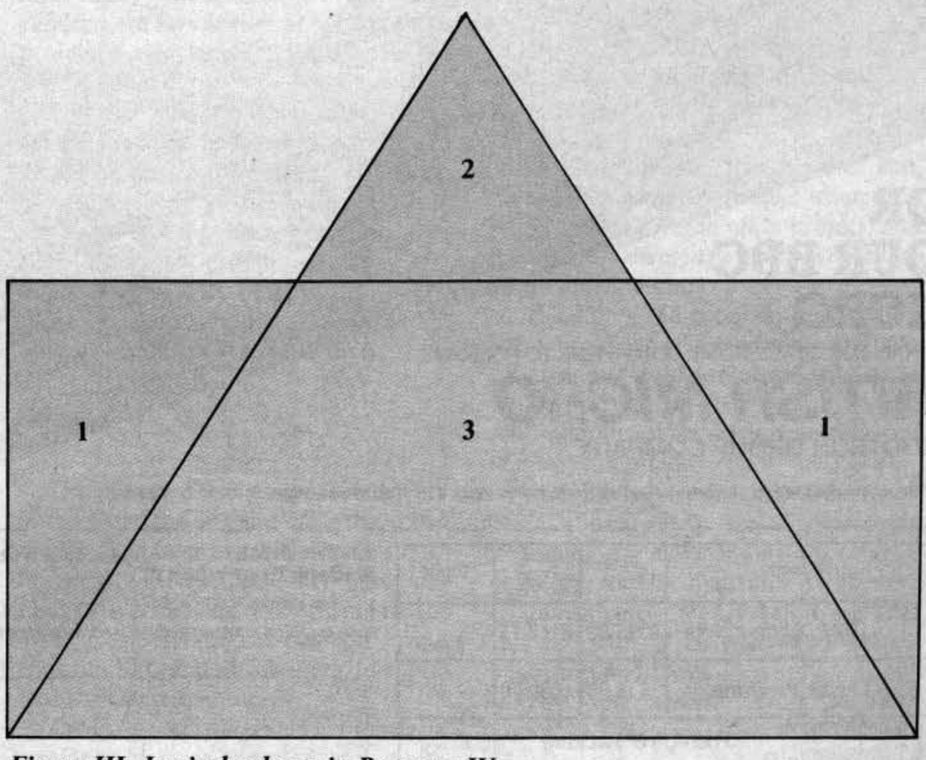

Figure III: Logical colours in Program IV

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Search for the Mary Rose – and discover the direction software should take

Mary Rose *Ginn*

AT LAST! Mary Rose is the type of program that should show the way forward to prospective programmers of educational software. It fulfils the criteria that the micro should not be merely an electronic blackboard.

This is a decision-making program, involving considerable work and research by children away from the micro.

On the surface of it (if you'll pardon the pun), the program is concerned with the search for the wreck of King Henry VIII's flagship, the Mary Rose, off the coast of Southsea, and the subsequent excavation of its artefacts before raising the hull.

The first part of the program involves the search for the Mary Rose. The superb graphics and sound capabilities of the BBC Micro are used well. A map showing the coastline adjacent to the search area is presented on the screen.

A knowledge of compass bearings, lines of longitude and latitude, coordinates and the ability to fix one's position by triangulation are required. However, these are fully explained in the excellent documentation that is part of the whole software package.

The various clues and artefacts presented in the search for the Mary Rose, can be marked with buoys.

Whenever a clue to the position of the ship is discovered and a marker buoy is "dropped", compass bearings of that position are automatically given which can be plotted on work maps away from the micro.

Obviously, these clues and the hull itself can be found in a haphazard way but with careful teaching the idea of a systematic sweep search of the area can be introduced.

The BBC Micro is used as an underwater sonar detector (and very realistic it sounds, too). The lower part of the screen is filled with a picture of the seabed. When a discovery is made, you drop a sonar marker buoy – but make sure you position it accurately!

This part of the program is really superb and well within the capabilities of children age nine and over. It gives scope for much work away from the Micro and the program can be returned to many times by individual or groups of users in their search for the Mary Rose.

The second part of the program assumes that you found the correct position, and begins by placing your search ship right over the Mary Rose. This is the more difficult part and I would suggest that Ginn, the publishers, are somewhat optimistic when the advertising literature states that the program is suitable for children age nine and upwards.

Let me put it another way: I, as well as "experts" from my local MEP centre, have not yet successfully achieved any really satisfactory result from this part of the program. But then, how many times have we seen that children are far quicker at solving these problems than adults? Remember the Rubik cube!

The user is now a diver with various search facilities at his disposal. Before diving he must go through a check list of equipment to ensure his safety. It is suggested in the documentation that each diver, or group, devises a 3D model of the search site by using unicubes or layers of squared acetate film, one for each ½m depth of dive.

The user now has to think and work in three dimensions and clear the site of mud. Apart from the difficulty of thinking in 3D terms, the other main difficulty is to ensure that the mud the diver clears from one position is not transferred to a position he has previously cleared.

Again, a considerable number of artefacts, such as cannons and combs, are there to be uncovered and raised to the surface. These are illustrated in an excellent pack of resource materials produced by the Mary Rose Trust, and the computer refers the children to them when they have made discoveries.

A continuous read-out of duration of dive, depth of dive, remaining air supply, and so on is given, but the main problem is orientation!

All results of this search are to be logged in the user's own site map or model and should also be saved on a separate data cassette or disc so that on return to the computer, time is not wasted going over old ground. Results of searches by individuals or groups may then be shared.

All this, of course, presupposes a fair degree of competency in computer management on the part of the class teacher.

A program of this nature can, indeed, last for many weeks when used as part of an overall class project, and will easily diversify itself across the whole curriculum.

At £32.50, the program may at first seem expensive when viewed in the light of present educational spending stringencies. Nevertheless, it is supplied with commendable documentation and support material.

With the current interest in the Mary Rose I can easily see this program becoming a classic among educational software, as Pac-man and its ilk were to games software. Overall, I consider this program to be well worth the investment, and I look forward to reviewing the other software from the Ginn stable.

Richard Jones

Trouble with this tape to disc system

Disc Executor *Vision Software*

WHEN you have experienced the luxury of having disc drives on your computer, the prospect of loading in programs from tape again tends to be rather alarming. The tapes seem to take longer than ever to load.

Wouldn't it be nice to be able to transfer those games to disc? Unfortunately, most commercial software is loaded in several modules to prevent it being copied, which also prevents them being transferred to disc.

The Disc Executor could be the answer to your problems. It allows programs to be loaded from tape in several modules and then run from disc.

The disc itself cannot be copied nor can the programs you copy onto it as they are stored using its own conventions rather than the standard Acorn disc filing system. So, when the disc is full, you have to buy another one.

To use the Disc Executor system, place it in the drive and press the Shift and Break keys simultaneously.

The system is menu driven and you are given a choice of saving a program to disc, deleting a program from disc or running a program previously stored on disc.

The names you give the programs can be up to 20 characters long as opposed to the maximum of seven on the normal filing system.

Full instructions are supplied and the system works in a logical and simple manner.

Well, that is the theory. How did it fare in practice?

When I first tried the system it would not work as I had the Watford DFS installed in my machine.

So I took it along to my second machine and again it did not work as this had a Telextext ROM installed in it. I removed this and the system came to life, and I successfully transferred a copy of Snapper (Acornsoft, as if you didn't know).

Unfortunately, this was the only program I possessed that would work with the disc. Let me quote from the supplied documentation: "Although Disc Executor allows the majority of tape-based software to be run from disc, it is impossible to do this for all programs".

This statement I found did not match my experience.

Programs I found would not load were Planetoid (Acornsoft), Tree of Knowledge (Acornsoft), Atlantas (IJK software), Chess (Computer Concepts) and four different educational software packages from ASK software.

I might have been unlucky, but most of the programs have been around for quite some time and I would have expected any package worth its salt to cope with at least some of these.

The documentation claims to be able to transfer the program Countdown To Doom (Acornsoft), so that would make two programs it could transfer, but I do not own that one so I couldn't test the claim.

No doubt claims will be made in future months for new and improved versions of the program and others of the same ilk.

It remains my opinion that no automatic disc transfer system is going to be able to cope with a program that has one ounce of sophisticated protection. The Disc Executor did nothing to change my opinion.

Disc Executor is produced by Vision Software and costs £11.

Mike Cook

3D Bomb Alley *Software Invasion*

IS IT because war is so much fun that we turn it into games? Or is it because we play so many war games that we go so eagerly to war?

These were some of the more serious thoughts sparked off by playing Software Invasion's game 3D Bomb Alley.

Mind you, there isn't too much time to think when you're actually playing the game!

The scenario is obviously based on San Carlos Bay in the Falklands. Your fleet is at anchor in a narrow sea inlet and you are under attack from enemy planes. These appear in the far distance but rapidly grow larger as they near.

To defend yourself you have to throw up a barrage of anti-aircraft fire. The trouble is that, although you can miss the planes, if they get through they don't miss you.

You get an extra ship for each 10 planes downed and the game ends when you've lost your last ship.

It's a simple game with nice graphics and adequate instructions. The way the planes appear in the distance and then grow larger is a good technique but it's annoying when they slow down and even appear to stop when under fire. You can almost feel the micro thinking.

At first I thought that that would mean a slow game, but I soon learned differently as the planes came at me five at a time.

It's a simple game where the main difficulty comes from the increasing number of enemy planes. If you like action where quick reactions are at a premium then this is one for you.

Eileen Young

Datext *Optima Software*

DATEXT, a teletext editor and display program, is the first offering I've seen from Optima Software. It comes nicely packaged with a small six-sided manual and contains two programs plus some example teletext pages.

The purpose of the software is to allow the user to create, store and display customised screens of information in as simple a way as possible.

The storage and display is certainly easy to use – up to 17 separate pages can be displayed in an automatic cycle with a specified display time.

Also, if desired, pages can be displayed selectively.

The editor is not quite so simple to use, for obvious reasons.

The exotic colour and graphic effects available from Mode 7 are achieved by the insertion of non-printing control codes on the screen.

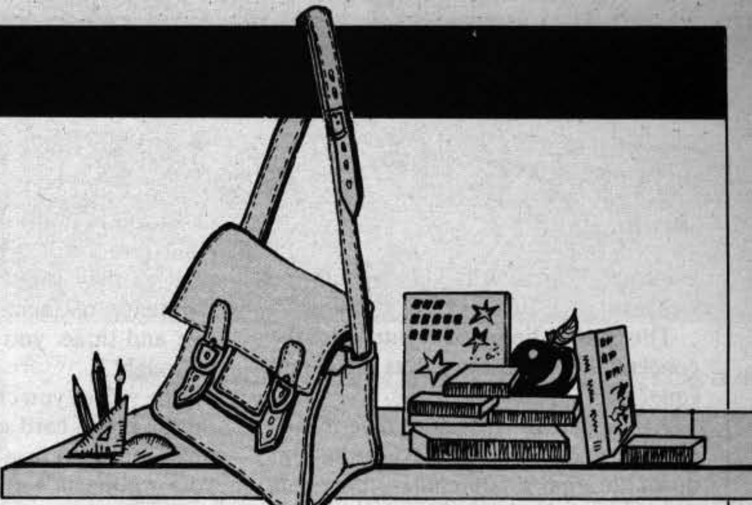
If these codes are not detected and indicated in some way by the editing program then a complex design can be very difficult to form.

Datext's editor does not contain this facility, and to me this is its only fault.

This aside, the editor gives access to all the available effects including flash, separated graphics and hold graphics, and very little practice soon allows the user to put together pleasing displays.

One final point is that Optima's animated logo is the best that I've seen.

Alan Plume



WENDY COOK evaluates four new educational programs

THE educational software from ASK consists of four tape packages of games for three to 12-year-olds. Each contains the cassette and a small information booklet about how to load and play the games and about their educational value.

The games load in modules, taking about four minutes to load in, which seems a long time if they are to be used in the classroom. But they are extremely well protected and defy attempts to transfer them to disc.

Fundamentally, all the games are "driven" in the same way, using a limited number of keys. This is an advantage because, once a child is familiar with driving one package, he will be able to transfer this familiarity to the others.

The only quibble I have with the way the programs are organised is that most of them do not give you the choice of returning to the menu at the end of a game. So unless you ESCAPE back to the beginning, the same game will come up ad nauseum.

A criticism from the hardware side is that the BREAK key is not disabled, which could be hazardous with young children on the loose.

Facemaker by Gloria Callaway.

A literacy game for five to 12-year-olds.

THE rationale behind Facemaker seems to be that children enjoy drawing faces and so they will enjoy a computer program which does the same.

Dubious this may be, but I suspect children will be amused by the computer's stiff efforts to draw Aunty Kathleen or whoever.

There is a lot of reading involved in this program, as the children have to read about various features before selecting what the computer should draw.

I suspect that many of the younger age-group – say, five and six year olds – would need help from an older child or adult.

As the reading is only slightly structured and as there is such a lot of vocabulary that is likely to be new, I doubt whether this really is a valuable tool for improving reading.

What it does provide is an intensely interactive situation where the child can readily see his responses controlling the computer.

Any educational value in the program probably lies in the fact that the child learns about interacting with a computer program.

Educational value aside, the game is fun and it holds your attention. But I am very doubtful whether it would do so for more than a few goes.

The blurb in the booklet says that this is not a game to keep the children amused over a wet playtime, but it strikes me that this is exactly the use to which it would be best suited.

The other children would have a wonderful time telling "the driver" to put earrings or a pompon hat on the headmaster.

So, for a classful of children, maybe a good idea for fun and class discussion. But it would probably pall too quickly to make it a worthwhile expenditure for a family.

Let's Count by Michael Holt.

Number games for children of three and over.

THE games are based on sound educational principles. Each one demands progressively more complicated mathematical skills.

The first game deals with matching objects, the second with matching objects to numbers, the third with ordering numbers and the last with "greater than" and "less than".

All the games can be played with numbers in the ranges 1-3, 0-4, 5-9 and 0-9. Introducing the concept of zero is a valuable feature as it is often neglected when we introduce children to numbers.

Treasure Island, the first of the games, plays jolly tunes and pops ships, with various numbers of shields on their sides, onto a sea dotted with treasure islands.

Your job is to send the ships to the island with the same number of treasure chests on it.

The child practises matching skills – matching the number of shields to the number of chests without necessarily being able to count them. This is an important skill to acquire in the understanding of numbers.

The only snag with this game is that often the first ship which appears has zero shields on it, which is a bit confusing at first. But on the whole, a useful exercise and quite good fun.

Space Stations begins life with one big disadvantage – the most anguished rendering of the Star Wars theme ever heard. After two goes I could stand it no longer.

That aside, the idea is to send the rocket with three windows to the space station with the number three on it, and so on.

Here the child learns to associate particular numbers of objects with certain numerals. Again the philosophy is sound and the game quite a good one for young children.

The third game, Roll-a-Ball, deals with ordering the numerals, such as 2,3,5,7.

The child sends a ball rolling down alleys to knock down each number successively, beginning with the smallest. The sound effects are very satisfying and this is another game that is quite good fun.

Unfortunately, the last game in the

From Page 53

package, Which Way?, is by far the weakest.

The game is designed to introduce the concepts of more than, less than and equal to.

A hopper of red and blue beads appears and the beads have to be sent down the appropriate chute – more reds than blues, more blues than reds, reds and blues equal. It is quite tricky to decide quickly and, as the beads won't go down the wrong chute anyway, it is much easier to just see which chute they will go down without bothering to count them at all.

I'm sure I'm not the only delinquent who will spot this!

Furthermore, once at the bottom of the chute, the beads are separated out into blues and reds but not in such in a way that you can easily see which beads there are more of.

The game doesn't even have the saving grace of being fun. It lacks pace and frankly I found it boring.

Overall, the games in this package are quite good – no more. And, although the educational thinking is sound, I would question whether such early concepts are best acquired using a computer or through concrete experience.

Even if the computer has an additional role to play at this stage, I suspect these games are not really exciting enough to fulfil it satisfactorily.

Number Puzzler by Mike Thomas.

Number games for four to 12-year-olds.

THIS package was definitely my favourite. The audio graphics are intriguingly unusual and sound a bit like our two-year-old son singing into a toothmug full of bubblebath – it does happen, really!

There are basically three options in this package– Additions, Subtractions and Additions and Subtractions (all variations on the same theme), Magic Squares and Self Test.

The first three games display "Bingo cards" of nine or 36 numbers and can all be played either by two people or as human v machine.

The latter participant, I may add, plays with devilish and mind-boggling speed and, I suspect, is not above indulging in a little skullduggery here and there.

At the bottom of the screen you are dealt two cards which you can either play as they stand or use the sum or difference of them. For instance with five and three, you might also use two and eight.

The values you choose change colour on the bingo card and the aim is to get three numbers in a row while blocking your opponent's efforts.

This is a game of quick-fire mental arithmetic which also involves strategies and tactics. It is fun and probably tones up those flabby brain bits you never knew you had.

Seriously, it is a good tool for training mental agility. It not only speeds up mathematical processes but helps learning, using and switching psychological strategies of searching, estimating and calculating.

The Magic Square program displays a nine square grid with three numbers already filled in.

Your job is to complete the grid so that – hopefully – all the rows, columns and diagonals have the same total.

The score is accumulated over three games, the almost impossible aim being to score over 100. This game is a good test of composition of number – that is, knowing how a number such as 13 can be split up in different ways, 8+4+1, 5+2+6, etc.

More obviously, it is a real test of thinking skill, as you need to hold a partial solution in mind while juggling with its implications for other lines.

Self Test simply requires answers to 10 sums, such as 3+4 or 76–28. Your score and time are kept.

It is disappointing that the speed of presentation does not vary whether you select SLOW or VERY FAST.

But at the end, when the score is given, it may say: "That was better than SLOW." It would be more of a challenge to have a faster presentation available.

The games in this package are challenging, undoubtedly educational and great fun. How four-year-olds would cope with much of the package is dubious, but I think children aged seven plus would enjoy it very much.

Hide & Seek by Gloria Calloway.

Memory and literacy games for five to 12-year-olds.

THIS package really concentrates on the younger age groups. It is another one produced by Gloria Callaway but it beats her Facemaker into the proverbial cocked hat.

Basically the games consist of a grid of six or nine boxes into which different objects are placed. Then, accompanied by happy little tumming sounds, pink and white shutters descend, and you try and remember what the heck went where.

There are several variations on this theme with varying degrees of trickiness, but they are all good fun and quite absorbing. The objects vary from elephants to geraniums, from rectangles to parrots.

In one game, as the objects are being hidden away, their names are printed beside them. Later the blinds are drawn back to reveal one object missing and the child steps through the various labels to find the right one.

The final variation is very similar to this except that the child has to spell out the answer, so practising spelling as well as reading and memory skills.

The first time I tried this one the missing object was a church and, when I typed the answer, it played some nice English church music for me.

Next time around, when the green triangle was missing, I expected a bit of Schoenberg, but alas I got the same old church music.

Actually, the memory skills these games exploit are extremely valuable when learning to read, as are the skills of categorising and labelling which the child is bound to use to aid his memory.

Categorisation is encouraged by the use of obvious categories, such as birds, buildings, shapes, which in some games appear on separate lines. For example, one grid contained pictures of:

cat	**square**	**church**
elephant	**rectangle**	**house**
bird	**triangle**	**hut**

The games where the player himself hides the objects are particularly useful for developing various feature-based strategies for recall.

For example, you can hide all the heavy things in the bottom squares, all the green things on the left and so on.

I reckon this package represents a sound investment. It will play more memory games than any parent could stand and makes sound educational sense.

Moreover, it is jolly good fun. Of all the packages, this is the one I will use with my pupils.

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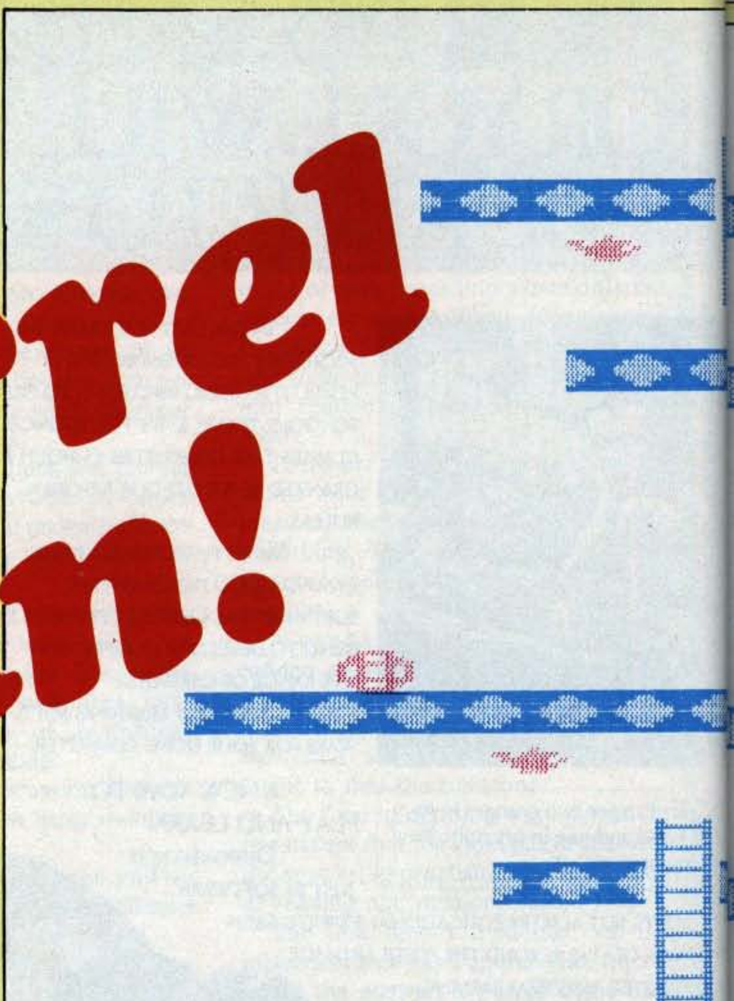
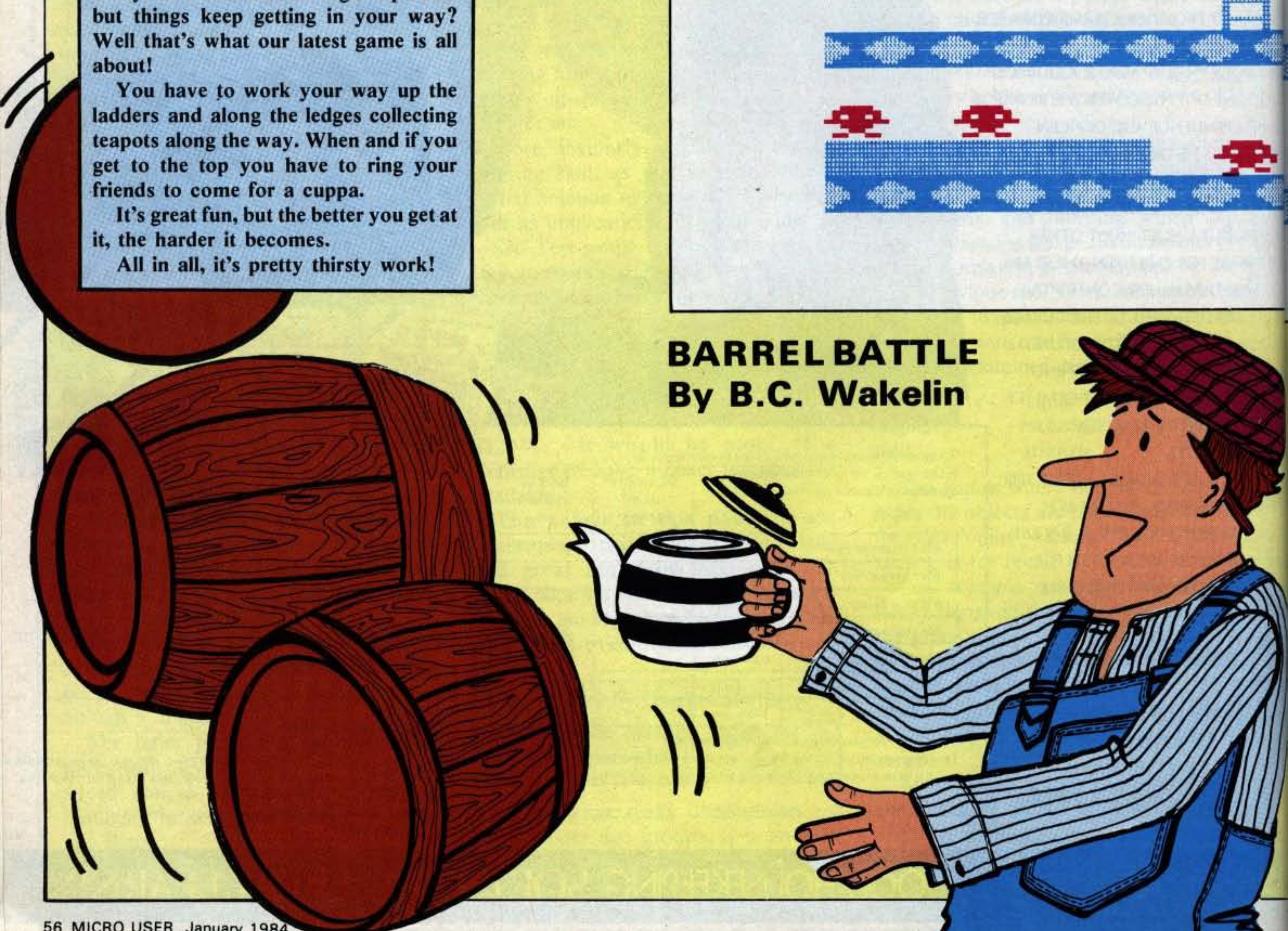
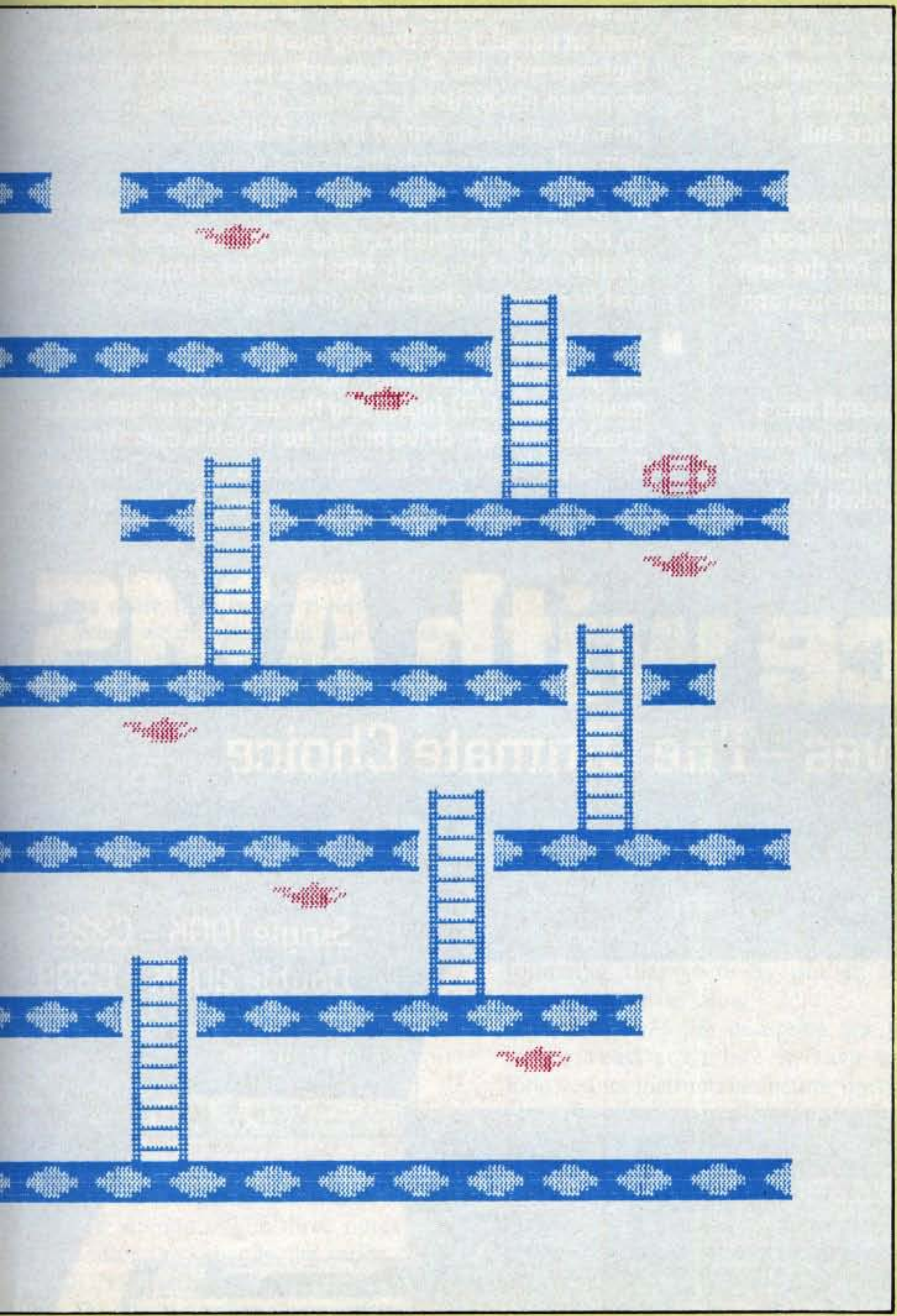
All in all, it's pretty thirsty work!



BARREL BATTLE
By B.C. Wakelin





Variable	Description
TP%	*High score.*
S%	*Your score.*
A%(n)	*X position of barrel n.*
B%(n)	*Y position of barrel n.*
D%(n)	*Direction of barrel n's movement.*
B%(n)	*True if barrel is dropping.*
O%(n)	*The colour of the character under the barrel.*
R%(n)	*The character the barrel is about to roll over.*
T%(n)	*The colour of the character the barrel is about to roll over.*
Q%(n)	*The character's colour that the barrel is over.*
F%(n)	*The last direction the barrel moved in before dropping.*
BA%	*The number of barrels in use.*
L%	*The sheet in play.*
LIV%	*Number of lives.*
E%(n)	*Barrel's vertical movement.*
B%	*Bonus.*
G%	*Number of teapots remaining.*
O%	*Character the creature is over.*
J%	*True if creature is jumping.*
X%	*X position of creature.*
Y%	*Y position of creature.*
C%	*Character representing creature.*
H%	*Horizontal move for creature.*
V%	*Vertical move for creature.*
R%	*Character creature is about to walk over.*
PO%	*The POINT value of the position to move to by creature.*
Q%	*Colour of character creature is on.*
T%	*Colour of character creature is about to walk on.*
I%,I,J%,J	*General variables.*
N%	*Note for tune.*
D%	*Duration of note for tune.*
M%	*Horizontal position while jumping.*
N%	*Vertical position while jumping.*
K%	*Part of jump in motion.*
x%	*X position of ladder.*
y%	*Y position of ladder.*
Q£	*Input from menu, etc.*
W%	*First sheet.*

Line No.	Description
5	*Data for tune.*
6-8	*Envelopes and graphics characters.*
9-10	*Set up main variables.*
11-13	*Set up screen.*
14	*Set up barrels.*
15	*Set up creature.*
16	*Remove cursor.*
17	*Check for jumping.*
18-22	*Check for input.*
23-26	*Check if illegal move or anything hit.*
27-29	*Check what creature is to walk over.*
30	*Check if creature is on floor or ladder.*
31-32	*Move creature.*
33	*Decrement bonus if necessary.*
34-38	*Move barrels.*
40-43	*Next sheet and play tune.*
44-46	*Creature's death, decrement life.*
47-48	*Grab a teapot and check if it was last one.*
49-57	*Jump routine.*
58-59	*End of jump, check if landed OK.*
60-62	*Print ladder PROC.*
63-64	*Fall routine.*
65-66	*Crash routine.*
67-71	*Level information for setting up screen.*
72-74	*Start position of barrels and initial direction.*
75-83	*More level information.*
84-107	*Instructions and menu.*

Listing starts on Page 123

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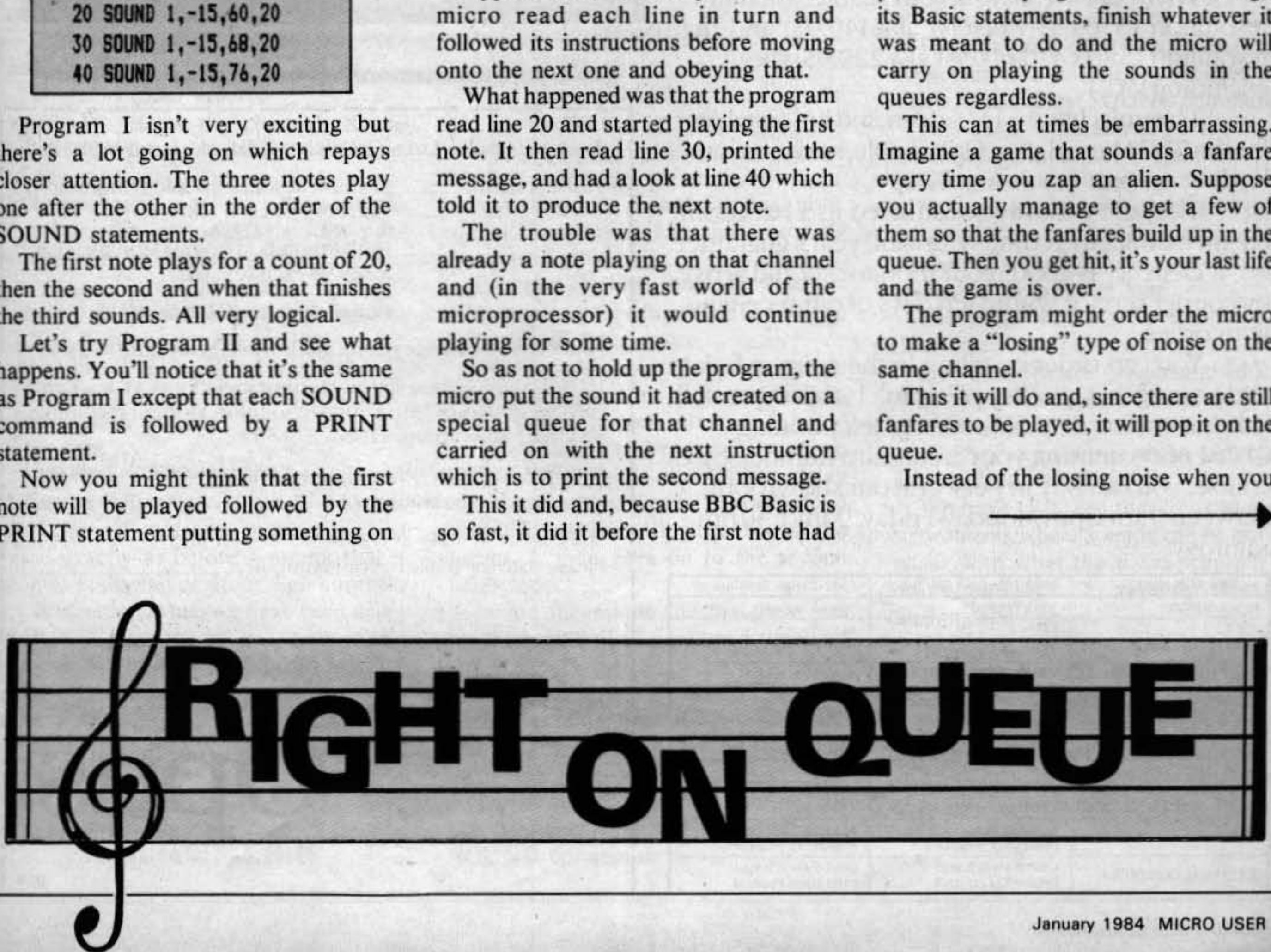
RIGHT ON QUEUE



THE Editor passed my desk on his way to his remedial reading group.

"Well", he said, "this series of articles has answered one of my doubts about you".

"What's that?" I asked rising to the bait, stupidly.

"I used to wonder whether you were deaf or daft. After hearing those programs of yours I know. You're both".

SO far our treatment of the SOUND command has been fairly limited. Ignoring the special effects channel, the BBC Micro has three sound channels available but we've mostly avoided using more than one at a time.

When we did the result was a mess – remember the random music generator!

To make more interesting noises we have to use more than one channel at a time.

To allow us to do this without causing chaos BBC Basic allows the SOUND command to be extended to control the flow of notes through the three channels.

For the time being, though, let's just stick to one channel and play three notes one after the other.

```
10 REM PROGRAM I
20 SOUND 1,-15,60,20
30 SOUND 1,-15,68,20
40 SOUND 1,-15,76,20
```

Program I isn't very exciting but there's a lot going on which repays closer attention. The three notes play one after the other in the order of the SOUND statements.

The first note plays for a count of 20, then the second and when that finishes the third sounds. All very logical.

Let's try Program II and see what happens. You'll notice that it's the same as Program I except that each SOUND command is followed by a PRINT statement.

Now you might think that the first note will be played followed by the PRINT statement putting something on screen, then the second note and so on. Have a go and see.

```
10 REM PROGRAM II
20 SOUND 1,-15,60,20
30 PRINT "NOTE1"
40 SOUND 1,-15,68,20
50 PRINT "NOTE2"
60 SOUND 1,-15,76,20
70 PRINT "NOTE3"
```

What actually occurred was that the three messages were printed on the screen before the first note had finished playing. Then the second note played, then the third.

The micro appeared to have jumped around the program lines instead of following them one by one in line number order as usual.

Appearances are deceptive, for the micro read each line in turn and followed its instructions before moving onto the next one and obeying that.

What happened was that the program read line 20 and started playing the first note. It then read line 30, printed the message, and had a look at line 40 which told it to produce the next note.

The trouble was that there was already a note playing on that channel and (in the very fast world of the microprocessor) it would continue playing for some time.

So as not to hold up the program, the micro put the sound it had created on a special queue for that channel and carried on with the next instruction which is to print the second message.

This it did and, because BBC Basic is so fast, it did it before the first note had stopped playing. It then came to line 60 which told it to play yet another note.

Because it hadn't finished the first yet, nor gone on to the second, it popped that note on the queue and went on to line 70.

The micro printed the last message and, as there were no more lines, the program stopped running. It did not stop making the noises, however, but carried on working its way down the queue.

The important point is that the micro continues to play the notes in the queue even after it has stopped processing a program's Basic commands.

In this sense the queues – each channel has its own – are independent of the program.

From this, you can see that it's possible for a program to rush through its Basic statements, finish whatever it was meant to do and the micro will carry on playing the sounds in the queues regardless.

This can at times be embarrassing. Imagine a game that sounds a fanfare every time you zap an alien. Suppose you actually manage to get a few of them so that the fanfares build up in the queue. Then you get hit, it's your last life and the game is over.

The program might order the micro to make a "losing" type of noise on the same channel.

This it will do and, since there are still fanfares to be played, it will pop it on the queue.

Instead of the losing noise when you

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get hit, you get a succession of fanfares until the queue reaches the losing sound.

In this sense the queue can be a bit of a nuisance, causing the sounds to be out of step with the program.

While the example above is fairly trivial it does show that silly things can happen.

It would be nice if there were a way of emptying the notes from the queue to give another note priority. This would allow an "important" sound to take precedence by wiping all the waiting sounds from the queue and so playing it immediately.

In our example, this would mean that the losing sound would be played immediately.

In fact, there is a way that you can get a SOUND command to take priority over others in the queue. It involves a different way of using the parameter that selects the channel.

This, if you remember, is the first number following the SOUND command. Up until now it has only been a single digit – 1, 2 or 3.

By using this channel parameter as a four figure hexadecimal number you can do all sorts of clever things with the simple SOUND command.

It is not as complicated as it sounds, especially as we'll only be concentrating on two of the figures.

Previously we've used the SOUND command in the format:

```
SOUND W,X,Y,Z
```

where W selects the channel, X the loudness, Y the pitch and Z the duration of the note.

In its expanded role as a hexadecimal number, the channel selection parameter can be looked on as:

```
&TUVW
```

where T, U, V, and W represent figures.

The T parameter we shall ignore for the time being. Similarly, the U parameter, which controls the synchronisation of notes, will be left to a later date.

All we are left with is V, which can have the values 0 or 1, and W which is the channel selection number and is used exactly as before – except that it comes at the end of a four digit number.

Previously, when we have been using SOUND, the micro has only come across W in the first position after SOUND and so has assumed that T, U and V were all 0.

What this means is that where we have used:

```
SOUND 1,-15,60,40
```

we could equally have used:

```
SOUND &0001,-15,60,40
```

The result would be the same and the SOUND command would work as we have come to expect.

If we want a SOUND command to be obeyed immediately, overriding any other notes that might be in the queue, we change the V parameter from 0 to 1.

When the program gets to this line it will obey that command immediately, stopping any note that's playing and "flushing" the queue.

```
10 REM PROGRAM III
20 SOUND 1,-15,60,20
30 SOUND 1,-15,68,20
40 SOUND&0011,-15,76,20
```

Let's see what happens if we change the last line of Program I to make Program III.

It seems as though the micro only plays the last note. What's actually happened is that the micro has read line 20 and started to play a note.

It then read the next line and put that note on the queue and got to the last SOUND instruction.

This had the V parameter set to 1 so the micro immediately cleared the queue, stopped playing the note that it was playing and played the final note.

```
10 REM PROGRAM IV
20 SOUND 1,-15,60,20
30 PROCdelay
40 SOUND 1,-15,68,20
50 PROCdelay
60 SOUND&0011,-15,76,20
70 END
80 DEF PROCdelay
90 FOR N=1 TO 1000:NEXT
100 ENDPROC
```

This happens so fast that you only hear the final sound.

Program IV slows things down a little with a delay procedure. Run it and you will hear all three notes.

The second line tells the micro to make a noise and, since there is nothing in the queue, it does this.

While this is still playing, the micro whirls through the first of the delay loops and when it gets to the second SOUND command it puts this on the queue. It then goes on to the second delay loop.

In the meantime, the first note has reached the end of its alloted time and stops.

The second note comes off the queue and starts playing but never reaches the full length specified by its duration parameter.

This is because the micro finishes the second delay loop and reads the next SOUND command.

This has a 1 for its V parameter so the computer immediately stops playing its present note and obeys that SOUND command straight away. Hence the shortened second note.

By making the V parameter a 1 you can ensure that SOUND command gets priority over all other sounds playing on that channel. In effect, it cuts short the note that is playing.

We could use this in the games program mentioned earlier to make the "losing" SOUND command get rid of all the fanfares in the queue and play immediately.

Also it can be used to ensure that noises are synchronised with whatever a program is doing by flushing the queues as in Program V.

```
10 REM PROGRAM V
20 SOUND 1,-15,60,20
30 PRINT "NOTE1"
40 SOUND 1,-15,68,20
50 PRINT "NOTE2"
60 SOUND 1,-15,76,20
70 PRINT "NOTE3"
80 FOR N=1 TO 100
90 PRINT"SOUNDING"
100 NEXT
110 SOUND &11,0,0,0
```

What has happened is that the micro has read the first SOUND command and played a note and then put the other two notes on the queue for channel 1.

Then the loop prints "sounding" on the screen and when it has finished the micro reads the last SOUND command.

This has a V parameter of 1, so it is executed immediately, flushing the queue at the same time.

However, since all the other parameters are 0 there is just silence and the sound's ending coincides with the ending of the printing loop.

You might notice from the last line that there is no need to put in the first two zeroes after the ampersand (&).

So far we've covered how the Sound commands can be stored in queues and how they can appear to operate independently of Basic.

We have also seen that this can lead to problems where sounds can be out of phase with what the Basic program is doing and how to remedy this by flushing the queues.

We have not mentioned how many sounds can be held in each queue and what happens when they are full. Try Program VI and see what happens.

From what happened in Program I you might expect that it would sound the first note while obeying all the

→

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```
10 REM PROGRAM VI
20 SOUND 1,-15,60,20
30 PRINT "NOISE1"
40 SOUND 1,-15,68,20
50 PRINT "NOISE2"
60 SOUND 1,-15,76,20
70 PRINT "NOISE3"
80 SOUND 1,-15,60,20
90 PRINT "NOISE4"
100 SOUND 1,-15,68,20
110 PRINT "NOISE5"
120 SOUND 1,-15,76,20
130 PRINT "NOISE6"
140 SOUND 1,-15,60,20
150 PRINT "NOISE7"
160 SOUND 1,-15,68,20
170 PRINT "NOISE8"
180 SOUND 1,-15,76,20
190 PRINT "NOISE9"
```

PRINT statements.

That is, NOISE1, NOISE2, ... NOISE9 would appear on the screen while the first note sounded.

When that note had finished, the other notes on the queue would take their turn.

What does take place is that the first note sounds with NOISE1 to NOISE6 appearing on the screen.

When the first note is finished, the second starts playing and NOISE7 is printed. The third note coincides with NOISE8, the fourth with NOISE9.

The reason for this is that although the Basic can carry on quickly by putting the SOUND commands on the queues these queues only have a limited capacity.

The manual says that each channel can hold four sounds as well as the one currently playing.

When the channels are full up, the micro will happily work its way through all the Basic statements until it comes to the next SOUND command. Here it comes to a halt until there's a place available on the queue.

This means that the program hangs until the note that's playing reaches the end of its duration parameter and the next note can come off the queue.

Then the SOUND command that's caused the delay can be processed and popped onto the queue allowing the program to continue.

This is the explanation for what happened in the last program. The program happily played the first sound and popped the rest on the queue until it could do no more and the program came to a stop.

When the first note stopped playing the sounds shuffled along the queue and made room for the SOUND command that was causing the delay.

The program then obeyed the next PRINT command, putting NOISE7 on the screen and went on to the next line. Here it came to a halt at the next SOUND statement and had to wait until the note stopped playing and so on.

The trouble is that, by my calculations, the program plays one sound and puts five on the queue before it grinds to a halt at the seventh SOUND command and has to wait to print NOISE7.

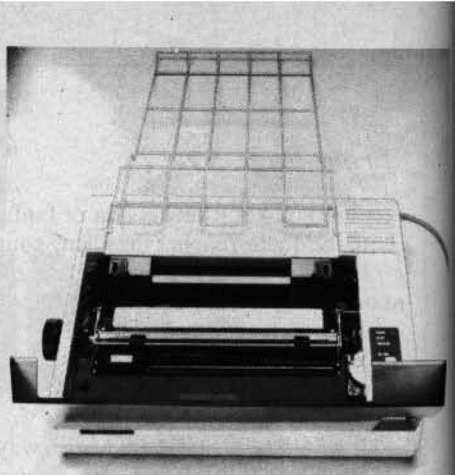
This seems to be one more than the manual would allow. Still, the point remains the same. When a channel's queue is full the next SOUND command for that channel will cause the program to wait.

Anyway that's all for now – I have to finish. The editor's come back after three or four pints of remedial reading and is sounding off. He looks flushed after so much queueing at the bar.

SOUND DOODLE

```
10 REM SOUND DOODLER
20 REM Nigel Peters
25 MODE 6
30 REPEAT
40 INPUT TAB(5,5)"Channel",channel
50 INPUT TAB(5,10)"Loudness",loudnes
   s
60 INPUT TAB(5,15)"Pitch",pitch

70 INPUT TAB(5,20)"Duration",duration
80 SOUND channel,loudness,pitch
   ,duration
 90 REM Note the cunning use of
    the flush command!
100 pause$=GET$
    :SOUND &11,0,0,0
    :SOUND &12,0,0,0
    :SOUND &13,0,0,0
    :SOUND &14,0,0,0
105 CLS
110 UNTIL FALSE
```



Specifications of the new Walters WM80

Printing method: Impact dot matrix.

Printing format: Alpha-numeric: 7 x 8 in 8 x 9 dot matrix field. Semi-graphic (character graphic): 7 x 8 dot matrix. Bit image graphic: Vertical 8 dots parallel, horizontal 640 dots serial/line.

Character size: 2.1mm w x 2.4mm h /7 x 8 dot matrix.

Character set: 228 ASCII characters. Normal and italic alpha-numeric fonts, symbols and semi-graphics.

Printing speed: 80 CPS, 640 dots/line per second.

Printing direction: Normal: Bidirectional, logic seeking. Superscript and bit image graphics: Unidirectional, left to right.

Dot graphics density: Normal: 640 dots/ 190.5mm line horizontal. Compressed characters: 1,280 dots/190mm line horizontal.

Line spacing: Normal: 4.23mm. Programmable in increments of 0.35mm and 0.118mm.

Columns/line: Normal size: 80 columns
Double width: 40 columns
Compressed print: 142 columns
Compressed/double width: 71 columns
The above can be mixed in a line.

Paper feed: Adjustable sprocket feed and friction feed.

Paper type: Fanfold. Single sheet thickness: 0.05mm to 0.25mm.
Paper width: 101.6mm to 254mm.

Number of copies: Original plus 3 copies by normal thickness paper. (Max 0.25mm. Total thickness of 4 ply).

MTEB: 5 million lines (excluding print head life).

Dimensions: 377mm w x 295mm d x 125mm h, incl. sprocket cover.

Weight: 5.3Kg approx.

Power requirement: 240 v ac.

Data transfer rate: 4,000 CPS max.

Synchronization: By external supplied STROBE pulses.

Handshaking: By ACKNLG or BUSY signals.

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The standard interface is Centronics parallel, RS-232C (SERIAL) is available as an optional extra. Programmable functions include variable margins and line spacing, horizontal and vertical tabulation, and 7 international language character sets. In total, it offers a 228 ASCII character set and has self-test facilities.

Major control codes include NUL, buzzer, backspace, line feed, horizontal and vertical tabulation, paper advance, carriage return, shift in, shift out.

Paper transport is by adjustable sprocket feed or friction. It uses fanfold paper, from 4" to 10" wide, printing up to three clear copies from an easily changed cartridge ribbon. Life expectancy of the print head is approximately 30 million characters.

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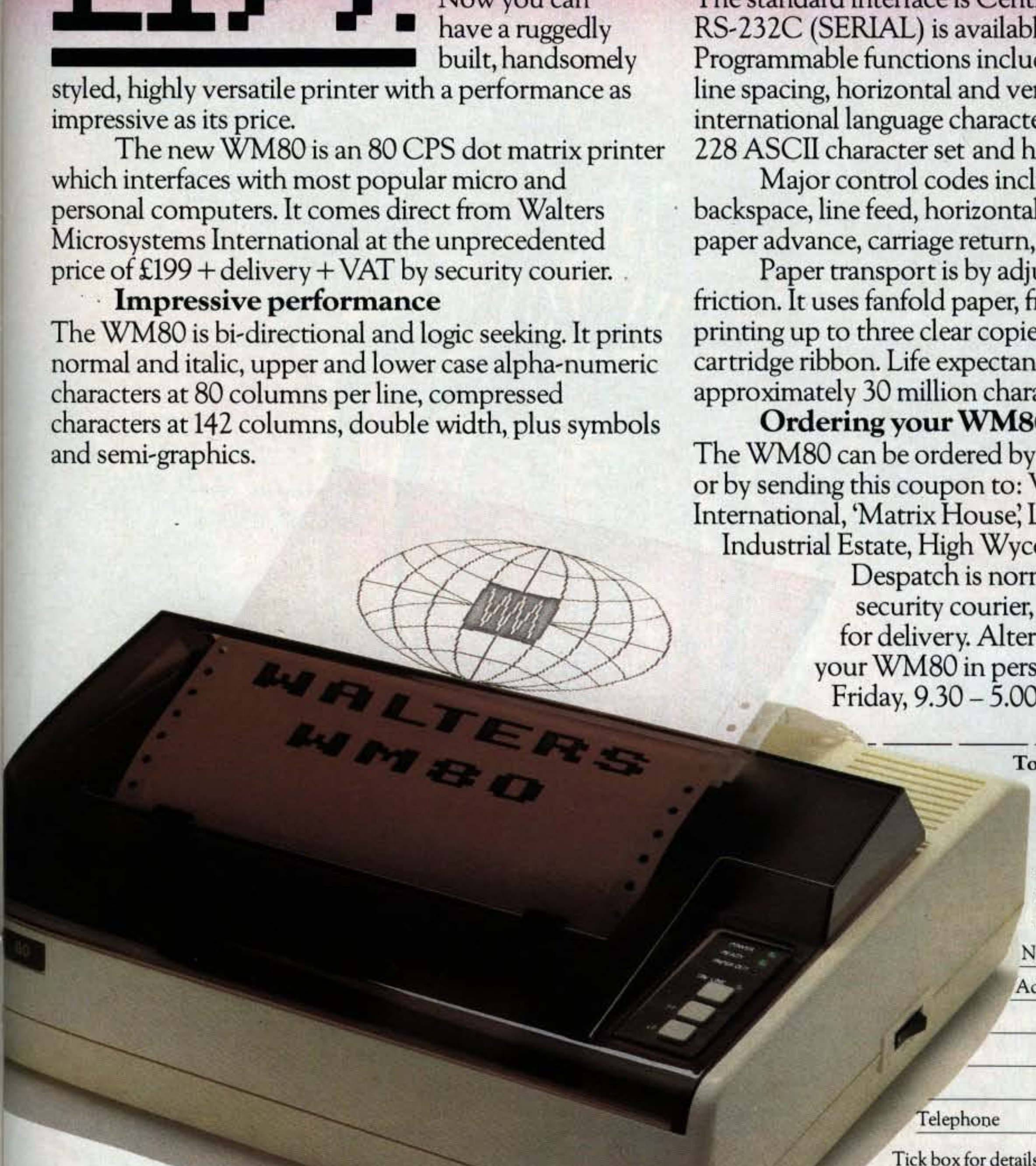

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GSL COMPUTING NEWS

JANUARY 1984

ISSUE 3

A **GSL** COMPUTING PUBLICATION

A NETWORKING MARRIAGE FOR THE BBC MICRO FROM GSL AND AMCOM

Rod Lewis(left), GSL's Sales Manager, discussing E-NET's speed, simplicity and versatility with a customer.

AMCOM'S E-NET is a flexible network filing system for the BBC microcomputer, specially designed in conjunction with GSL for Education use. It uses the network interface in the BBC machine so that if you already have networked machines it only requires fitting a new ROM in each clients machine and installing the Hard Disc Unit. (If you do not have network B's then a network interface has to be fitted to each machine).

E - NET allows up to 200 computers to share a common, large central disc store, and overcomes many of the inconvenient features of earlier network systems.

E-NET uses a hard disc unit as the central disc store, allowing upwards of 8 Megabytes of storage. It has effective, simple structures to limit the disc space available to any user, and to permit access by any user to library programs. Many users of the few simple networks installed so far have complained of the difficulty of monitoring pupil's use of disc space, but E-NET overcomes all these problems by doing the monitoring for you. You simply allocate a space limit to each user on the Hard Disc using the simple command program. For most schools and colleges this size disc will allow each user to have a reasonable file store, but it can be extended if required by adding further hard disc units. Important files can be easily copied to minifloppies if required.

E-NET has many useful extra commands. For example a simple command which only operates from the master (teacher's) machine, and which forces each client machine (in a certain specified room or area) to load and run a particular program is included. This is very fast, and flexible, and allows for efficient use of C.A.L. packages. Care has been taken to ensure that the command structure is simple enough not to intimidate the non-specialist, while remaining flexible and robust.

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E-NET is fast, simple to use and versatile. The first system being installed for use in September, and demonstrations can be arranged.

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Our catalogue has details of the GEMINI programs, which we reckon are the easiest to understand and the safest to use - we do! **BEEBCALC, BEEBPLOT, DATABASE** and **HOME ACCOUNTS** are £19.95 each. Each comes with a very helpful manual and a demo tape in a library case big enough to contain your own saved files too.

BITS & BYTES

The inside story of binary operations...

By MIKE BIBBY

IN previous articles, we've seen that binary numbers can be added and subtracted just as our more familiar decimal numbers are. And, of course, we can multiply and divide them.

There are, however, other ways of combining two binary numbers that are extremely useful in dealing with computers. They're also easy to use, so let's have a look at them!

Firstly, we'll see how we can NOT a binary number – simple, one-bit numbers first. By the way, we're going to be dealing exclusively with binary numbers this month, so we can drop the % sign.

The rules for doing a NOT are simple:

If the bit is 1 then it becomes 0
If the bit is 0 then it becomes 1

If you like, the NOT converts a bit into its opposite.

So **NOT 1 = 0**
And **NOT 0 = 1**

Why do we use the word NOT? Well, mathematicians often use the number 1 to mean TRUE and 0 to mean FALSE.

So NOT 1 means NOT TRUE, which means FALSE, which is 0. That is, NOT 1 is 0. And, as NOT FALSE is most certainly TRUE, NOT 0 is 1.

If we are to NOT a binary number consisting of several bits, we simply apply the rule for NOT to each bit individually.

So **NOT 10110010**
becomes **01001101**

Some people think of this process as "turning the number on its head" – so it's sometimes called inverting. Others call it taking the complement of the number.

NOT just works on a single binary number. However, there are other sums or operations that have a set of rules for combining two binary numbers.

For instance we can AND two binary numbers. Let's look at the rules for ANDing a single bit with another bit.

When you think about it, there are four possible combinations of bits that we could AND: 0 with 0,0 with 1, 1 with 0 and 1 with 1.

We write that we are ANDing, say, 0 with 1 as 0 AND 1.

The rules for ANDing are:

0 AND 0 = 0 (case a)
0 AND 1 = 0 (case b)
1 AND 0 = 0 (case c)
1 AND 1 = 1 (case d)

Notice that the only time the result is 1 (TRUE) is when the two bits ANDed are both 1 (TRUE). This helps us to see why we use the word AND to describe the operation.

If you think of the first bit as "this" and the second bit as "that", what we're doing when we're ANDing is asking whether "this and that" is true

"This and that" can only be true when both "this" is true AND "that", is true – hence the use of AND to describe the process.

For example, consider the statement that it is

dry and sunny

This is true only if dry is true and sunny is true (case d).

If either of the two (or both) are false (cases a, b, c) the whole statement is false, since it isn't both dry and sunny.

We can AND pairs of binary numbers of more than one bit – just apply the rules of ANDing to each bit individually.

For example

AND 10010110
AND 10110011
gives **10010010**

We can also OR two binary numbers. The rules for ORing a single bit with another bit are as follows (again there are four possible combinations):

0 OR 0 = 0 (case e)
0 OR 1 = 1 (case f)
1 OR 0 = 1 (case g)
1 OR 1 = 1 (case h)

In this case, you only get a FALSE result (0) when both bits are FALSE. If either or both bits are TRUE (1) the result is TRUE. It's easy to see why we use OR to describe this. If one, OR the other, OR both is true the whole thing is true!

Let's use the meteorological analogy again. Let's consider the statement that it is

dry or sunny

This is only FALSE when it is NOT dry and NOT sunny (case e), otherwise it is TRUE (cases f, g, h).

To sum up, with OR, the whole thing is true if either or both the things being ORed is true.

As we did with AND, we can OR pairs of numbers with more than one bit – we just apply the rules of ORing to each bit individually.

For example:

10010110
OR 10110011
gives **10110111**

- *In the next article in this occasional series, we'll look at EOR, and the use of masks.*

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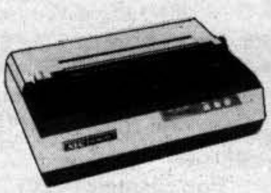

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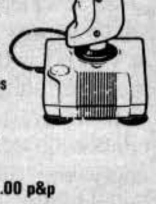

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WIN!

this revolutionary AMS 3in disc drive

Our latest contest is one for everybody to enter!

OUR fainthearted letter writer, Bob, has had the temerity to upgrade his micro to discs – without informing the formidable Andrea.

What we'd like from you, in not more than 50 words, is the most original, and humorous, "reason" he could give to Andrea to justify his audacious and unauthorised expenditure.

Send your entry, on the coupon on this page, to reach us no later than January 31.

This month's prize is the revolutionary new 3in disc drive from AMS.

This neat package features the unique "flippable" plastic discs, capable of holding 100k on each side, which are virtually indestructible.

The drive, which comes complete with utilities on both disc and eprom, is compatible with all current disc filing systems and 5¼in drives.

DISC DRIVE CONTEST

Bob's justification for his unauthorised expenditure on a disc system is . . .

____

____

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(Not more than 50 words.)

Name ________________

Address ________________

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Send your entry to:

Disc Drive Contest,
The Micro User, Europa House,
68 Chester Road, Hazel Grove,
Stockport SK7 5NY.

Limerick contest winner

THE winner of the October limerick competition was Mr T. McGeary, of East Kilbride. He wins the Acorn Telesoftware Downloader.

His winning entry was:

There was a young man with a Beeb,
Who, obsessed by genetics and greed,
Linked his Beeb to a second,
And said, "What I've reckoned
Is that any day now they might breed".

This was one of the most enjoyable competitions to judge – and we've decided to share some of the runners-up with you. They'll each be receiving a *Micro User* dust cover for their worthy efforts.

RUNNERS-UP

There was a young man with a Beeb,
Who over his phone could receive,
Prestel and Viewdata,
But was sad to find later
That he couldn't phone home like E.T.!

Nigel Nock, Caerphilly.

★ ★ ★

There was a young man with a Beeb,
Who yearned for more and more speed,
'Til one moment when troubled
The voltage he doubled,
A very sad moment indeed!

Richard Trout, Oldham

There was a young man with a Beeb,
Whilst keying PROCtrees wrote PROCtreeb,
Instead of a wood to hide Robin Hood,
He got no such PROC at line threeb.

F. Mitchell, Wakefield.

★ ★ ★

There was a young man with a Beeb,
Whose girlfriend thought him naive,
For each night as he wooed her
He'd peruse "Micro User"
For a hint on how to PROCeed.

J. Farrel, Leicester

★ ★ ★

There was a young man with a Beeb,
Who wanted to program at speed,
He started in Algol,
Conquered Pascal and Cobol,
But machine code just wouldn't concede.

K.W. Hunter, Pool of Muckhart.

★ ★ ★

There was a young man with a Beeb,
Whose progress was hard to believe,
He did wonderful things
With procedures and strings,
And a ROM or two tucked up his sleeve.

Elisabeth Abbott, London.

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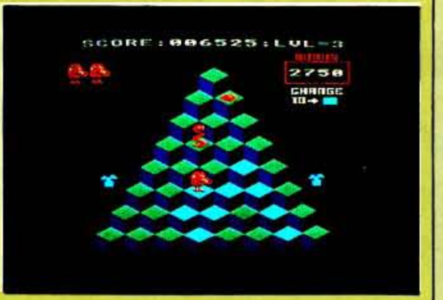
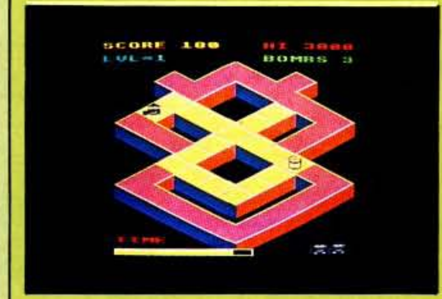
Q-MAN



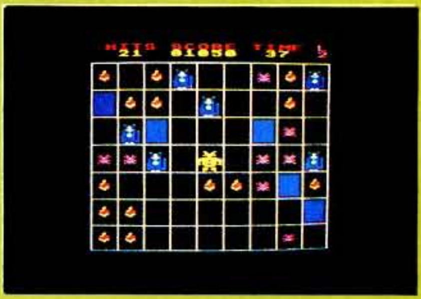
The very popular 3D pyramid game. Hop around the pyramid avoiding the bouncing balls and Jake the Snake. A highly entertaining game with increasing difficulty plus our own totally unique features. Game includes TRANSPORT DISCS, BONUS, HIGH-SCORE TABLE, HYPERSPACE and SMART BOMBS. Excellent graphics and terrific sound. One of the three top selling games on MICRONET this month.

Q-MAN'S BROTHER



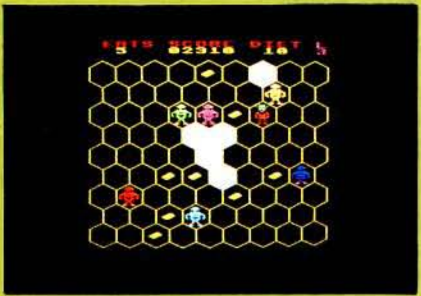
Q-MAN'S BROTHER is featured in the high score table of Q-MAN and now has his very own game. Have you time to paint all of the maze? Not if the PAINT POTS have anything to do with it or especially the deadly PAINT ROLLER which will erase all of your hard work! Increasing difficulty, excellent sound, AMAZING 3D graphics and high score.

BANANA MAN



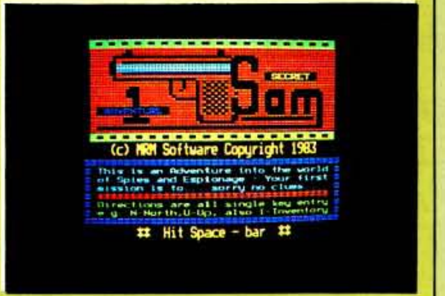
A totally new concept from MRM. You are the BANANA MAN and you must eat 40 BANANA SANDWICHES each minute to stay alive. There are BLUE BLOCKS which may prevent you from reaching the food and deadly PURPLE TARANTULAS that are fatal if stepped upon. ETHEL the CAT also appears but can be scared away for mystery points. But watch out, she conceals a spider. Features include BONUS BANANAS, BLOCK 'SHUFFLE', INCREASING DIFFICULTY, HIGH-SCORE TABLE and GREAT GRAPHICS.

GUY IN THE HAT



You are THE GUY IN THE HAT entombed in a honeycomb labyrinth. Like BANANA MAN you have an increasing daily food diet, but this time your favourite snack is a BICKIE. Beware of the pursuing BICKIE BASHERS that are trying to ensnare you. Gain extra points by dropping your exploding hat and trapping the BICKIE BASHERS. Movement in 6 directions, HYPERLEAP and menacing sounds are included along with the usual great graphics and high-score table.

SECRET SAM SERIES



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This is an Adventure into the world of Spies and Espionage - Your first mission is to... sorry no clues

Directions are all single key entry e.g. N-North,U-Up, also I-Inventory

Hit Space - bar

Two great original adventure games from MRM. Written in plain English on a spy based theme. Travel around meeting AGENTS, collecting CLUES and ITEMS that will aid you in your mission. SAM1 and SAM2 are completely separate missions and each game is a thoroughly enjoyable adventure in its own right. Many hours of frustrating fun plus sound effects.

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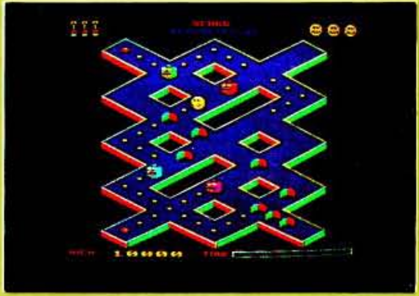

A visually stunning version of the now legendary arcade classic . . . with a difference. Eat power pellets whilst avoiding the GHOSTS as usual, but can you get past the HOLES? Absolutely amazing graphics and sounds, increasing difficulty and high score. All this and you're battling against the clock as well. A CLASSIC from MRM.

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Back numbers are still available at £1.25 (incl. p&p)

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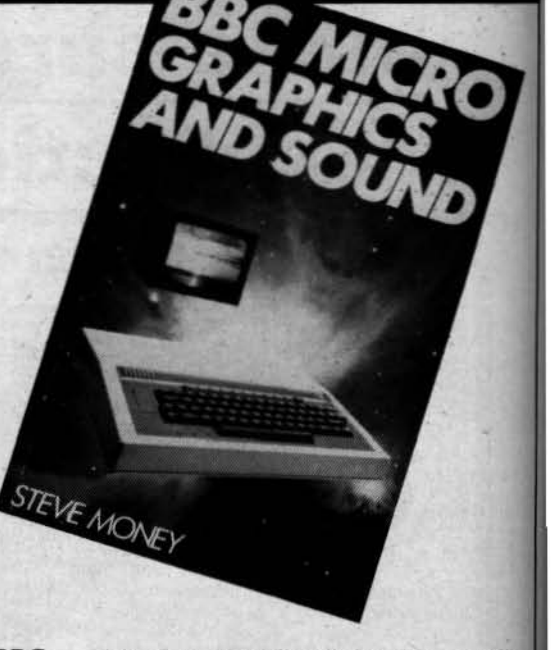
Getting to grips with graphics and sound



BBC Micro Graphics and Sound
By Steve Money (Granada)

BBC Micro Graphics and Sound aims to explain the graphics and sound facilities of the BBC Micro in simple terms and to show how they can be used.

Each of the micro's graphics and sound statements are explained, usually in a more readable form than in the User Guide.

To demonstrate the ideas and techniques discussed there are more than 80 program listings and examples.

The book explains the techniques and equations necessary to draw two dimensional shapes, such as polygons and circles, and shows how to rotate them.

Several methods of achieving the same result are given with an indication of the best one for a given situation.

Also a section on three dimensional plotting, including perspective and rotation, shows how realistic displays can be produced.

The chapters on colour help to clarify, the use of the various plot and fill commands and shows how the GCOL statement works.

Using this information, clever methods of erasing lines and simple ways of hiding objects behind other objects are shown.

Methods of using colour and graphics in Mode 7 are also discussed.

The mathematics involved in some of the explanations is difficult to follow, particularly in the three dimensional section, but this is partly due to the nature of the subject matter.

The examples, however, do enable you to use the techniques illustrated without necessarily understanding the mathematics.

A very useful section on graphs and charts shows how bar and pie charts in two or three dimensions are created.

The section on the BBC Micro's sound facility helps to simplify the complex ENVELOPE command. It shows with numerous examples, how to make the sounds you want.

Despite this I get the impression that the author is unfamiliar with the BBC Micro, as he has made many mistakes about BBC Basic.

For instance, he failed to acknowledge the existence of the keywords RAD and DEG, and suggested that to change degrees to radians use the formula RAD = DEG * PI / 180.

Similarly, he interpreted the statement GCOL4,C to mean that the colour plotted would be the inverse of the colour C. It is, in fact, the inverse of the colour already on the screen.

There are also errors due to misprints. Happily all these are usually easy to detect by running the book's examples and suggestions on the computer.

Also one understands something far better if you've had to find the mistakes first.

Having said this, the book is a useful reference for people wanting to know how to draw graphs, shapes, and patterns, and handle three dimensions, animation and the envelope commands on their BBC Micro.

Eric H. Crisp

Too little of what you fancy..

The Companion to the BBC Micro
By Geof Wheelwright (Pan)

MY first feeling on being given the Companion was pleasure at receiving what promised to be a fascinating book, not just another "Basic, how to" manual.

Sadly, disappointment soon followed. Not, I hasten to add, because it is a bad book.

No, what there is of it is informative and well written. The trouble is that there isn't that much of it.

The major part of the book consists of 92 pages. These are augmented with 11 appendices consisting mostly of example programs which add little to the book.

The main text is more rewarding, beginning with a concise but illuminating history of the BBC Micro and going on to explore its innards.

The author then goes off on an idiosyncratic tour of seemingly unrelated subjects which gives some idea of the scope of the BBC Micro, but without any real depth of treatment.

Word processing, computer games, printers and Econet are covered, as are alternative languages, science and the "storage story".

All that is said is interesting and accurate. But when you consider the wide range of subjects attempted in the small number of pages it becomes evident that the treatment of each is fairly limited.

Certainly the book is worth reading. I couldn't put it down until I'd finished it. I just wish I hadn't finished it so quickly.

The question is, is it worth buying? As a bedside book for Beeb enthusiasts it might be. But it's certainly not the "Complete Reference Companion for all BBC users" the blurb on the back would have you believe.

Nigel Peters

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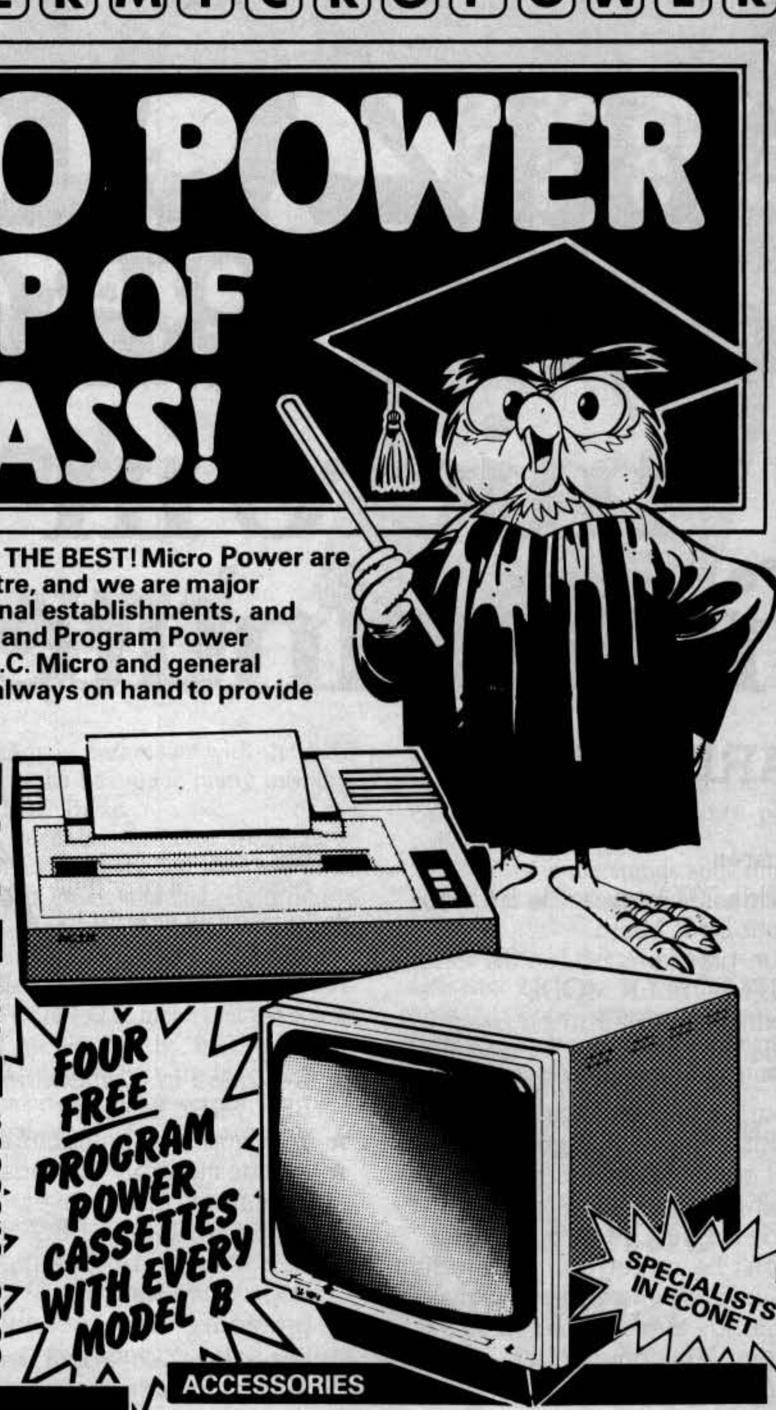

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MICRO POWER - PUT TO THE TEST WE'LL PASS WITH HONOURS!

Crystal clear speech – and in any language

Voxbox
Multiplex Computer Services

THE Voxbox is yet another device to allow your computer to talk. But, unlike the Acorn speech synthesiser, its vocabulary is unlimited.

Other speech synthesisers claiming this use a system known as allophones and, although they also offer an unlimited vocabulary, it is not very clear.

The Voxbox, however, produces crystal clear speech in any accent or language you require.

It uses a technique known as Delta pulse code modulation to effectively make a digital "tape" recording of any sound you care to input into its microphone.

To create a word or phrase, you speak it into a microphone. It is then digitised and stored in memory and can be replayed so you can hear if it is correct.

Several words or phrases may be defined in this way until you have used all the memory reserved for speech data. You may then replay the phrases or words, strung together in any sequence you like.

Along with each section of speech is stored a string variable. This is usually what is said, but can be anything.

The memory containing the speech data can then be saved as a file on disc and incorporated in your own programs.

The problem with this type of speech synthesis is that it takes up large amounts of memory, although this is eased in The Voxbox by using delta modulation.

This is where the size of the digital sample is not stored, but rather the difference in size between the last sample and the current one.

Also, the rate at which samples are taken determine the quality of the final speech. The faster the rate, the better the speech. But this uses up the memory faster and you cannot get as many words stored.

The software provided with The Voxbox allows you to choose between one of 10 sample rates to enable you to get the best length and quality trade-off for your application.

These give you approximately six to 16 seconds of speech, using the maximum amount of memory available.

The quality at the fast rate is very good indeed, almost as good as a cassette tape recorder or a telephone.

As the rate slows down, the sound gets increasingly muddy. However, it never degenerates into the awful "computer speech" much beloved of film and television producers.

Once you have built your voice files, they may be incorporated into your own Basic programs.

There is a small machine-code module which allows you to do this and on the disc I received was an example of how it can work.

The program is called "GREET" and gives you a choice of five different languages to try. After selecting one, the screen displays the word of greeting in that language and the Voxbox says it.

You are then requested to imitate the word and your attempt is recorded. As a final act of humiliation, the original word and your attempt are played back to you.

My particular favourite language was Australian. Apparently, the Australian for hello is G'DAY.

The Voxbox really does require a set-up with discs to handle the large voice files you create. I can see this being especially useful for teachers who want to write programs which ask the children to spell particular words.

The bank of words can then be individually tailored for the age range or specific difficulty of children.

In fact, you do not have to stick to speech. Any sound can be recorded and played back in your application.

All in all, an excellent product, reasonably priced, and one that the editor had extreme difficulty getting off me to return to the manufacturers.

Voxbox is produced by Multiplex and costs £89. **Mike Cook**

Discover the delights of your user port

Interface
Electronic Developments Services

INTERFACE is a combination hardware and software package based around the user port.

It requires the full complement of 32k of RAM to run and, of course, a user port.

The small printed circuit board is attached to the BBC Micro via two feet of ribbon cable. Each line from the user port has an LED attached, green for the data lines and red for the control lines.

There is also a switch for each line, as well as an on/off switch. These switches are of the "dual in line" type and can be a little fiddly to operate but you can use them quite easily if you push them with a sharpened pencil.

The software package consists of some 22 pages of information about the VIA that makes the user port connection of the BBC Micro.

Some of the pages are interactive, allowing you to see the effect of writing numbers to the port (the lights come on) or reading data from the port (by moving the switches).

The pièce de resistance is a full screen display of all the registers in the VIA, allowing you to alter any of them easily.

The description of interrupts was a little sketchy with an example of how a hypothetical Basic statement might be structured to respond to one. However, no applications are given or even hinted at.

The data in the pages of multi-coloured text are brisk and to the point, in the same style as teletext. However, the interactive element will allow a complete beginner to gain insight into some of the delights of the user port.

Interface is produced by Electronic Developments Services and costs £25.

Mike Cook

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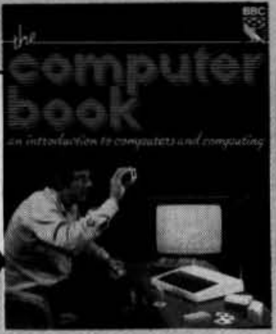
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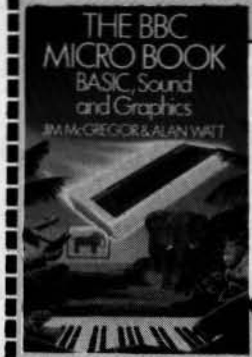
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Machine code monitor comes to your aid

A SOPHISTICATED ROM-based machine code monitor, AID, in common with other monitors, incorporates:

- A full disassembler
- Memory move and alteration
- String search
- Register display and alteration
- Stack manipulation

However AID offers additional features far in advance of other monitors.

For instance, AID enables you to interrupt machine code programs as they run, either at predefined positions or after each instruction. CLI and VDU commands may be used during such interrupts.

In addition, AID allows you to relocate programs, data or both, with jump and data addresses being changed accordingly.

One unique facility is its ability to leave the program screen display unaffected when displaying AID information.

These features, together with the fact that it is ROM based, make AID a very powerful monitor.

My immediate impression of AID was that it was a very professional product. Despite the monitor's complexity, after a short familiarisation period, I found it easy to use, particularly as the User Guide is very thorough and accurate.

For example, the fitting instructions for the eprom left me in no doubt where and how to install it.

When I switched on and typed *AID, an aesthetically pleasing Mode 7 display appeared, much better than the stark black and white display often associated with machine code monitors.

I quickly went through the usual monitor facilities of hex dumping, disassembling, memory modification, register changing and string searching, finding them satisfactory.

I also found AID friendly to use with its two letter commands, sometimes followed by hex digits, and helpful error messages and responses.

Next, I decided to experiment with a small machine code program. I used AID's "single cycle" facility which enabled me to watch the effect of each machine code instruction on registers and flags.

Whenever I wanted I was able to look at any area of memory and still come back to do the next instruction with all the flags and registers unchanged.

If I desired, these registers, flags and memory locations could be changed before executing the next instruction.

I wish I had had something like this when I first started dabbling in machine code!

I then used AID's "break points", which are BRK instructions inserted in place of an opcode so that the machine code program is interrupted at a specified point.

Up to 12 such break points can be inserted at any one time.

When the machine code is run, AID handles the break points by giving the usual display of registers and disassembled code. At this point it is then possible to interrogate and change memory and registers as desired before continuing.

In fact, any of AID's commands can

➡

A way to solve software blues?

ATPL have introduced a sideways ROM/RAM board that might help you solve the ROM software blues. It allows you to have up to 16 sideways ROMs, the maximum the software will support.

In addition to the four sockets already inside your computer, the ATPL expansion board gives you 13 more, as well as some unique extra options.

The board is extremely high quality and measures about 6in by 8in. It is designed to be installed without the need for any soldering.

It does this by removing the operating system and the analogue to digital converter ICs and straddling those two sockets.

In addition, two flying leads have to be connected to two pins which were formerly used as a link. The two ICs you have removed are then plugged into the expansion board and you are ready to go.

The header plugs used to attach the expansion board are the narrow round-pin type and should not damage your sockets in any way. These allow you to remove the board if you wish, although I can't think why you would.

The board spans as area on the main printed circuit board that does not generate much heat and so you are less likely to experience overheating problems if we ever have a summer again.

With the board installed you no longer have to limit yourself to a small range of ROM based software. You can even put your own favourite Basic programs in ROM and download them for instant access *(see the December 1983 issue of The Micro User.)*

The ATPL sideways expansion board has one feature that may be of great use to you in the future – the ability to accept a sideways RAM.

This RAM cannot be used for longer Basic programs but may be used to develop your own software, in machine code, to run in this area.

The RAM appears to be ROM number 15 and, whenever a write is made to the sideways area, the RAM is accessed, irrespective of which ROM is currently enabled.

There is also an option which allows this RAM to be constantly supplied with current so that it will not get an attack of instant amnesia every time the computer is switched off.

This option is provided by a small battery that is recharged whenever the computer is switched on.

Unfortunately the current price of the static RAMs the board uses is rather high and it will cost you about another £80 for the components. However the price is bound to come down in time.

If you have the need for a lot of ROM based software at £38 this board certainly deserves your attention.

Mike Cook

From Page 79

be invoked at this stage as well as VDU and CLI commands. Provided the command does not cause a reinitialisation, then the program can be resumed from the break point as if the break point were not there.

The break points can be removed on request and the original opcode restored.

The next facility I used was relocation of code and data. The instructions seemed daunting at first, but it was really quite simple once I realised what was going on.

It is all a question of informing AID what you are going to move, from where and to where, and whether jump and data addresses are to be changed. In this latter case, the old and new address range needs to be quoted.

I was able to relocate ROM based code into RAM by moving it first and then changing the jump addresses. This enabled these routines to be scrutinised by single cycling or by introducing breakpoints.

The last facet I explored was the dual screen facility, which is perhaps the pearl of the system.

To test this facility I loaded a machine code program that plotted direct to a Mode 5 screen. I then initialised the dual screen facility so that the AID screen did not interfere with my Mode 5 program screen.

I also introduced a few break points so the monitor would interrupt my program.

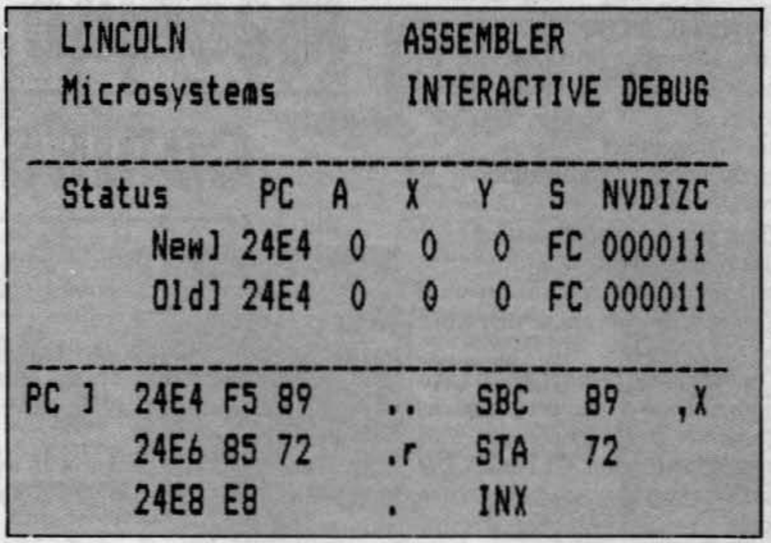
When I ran it, it started drawing on the program screen, then the AID screen appeared as a break point was reached. I then typed the command for viewing the program screen, and there it was – still in one piece!

I was able to switch between program screen and AID screen at will and use VDU commands from the AID screen that affected only the program screen. When I allowed my program to continue, it did so as if no interruption had occurred.

Later I loaded a program consisting of Basic and machine code that plotted on a Mode 5 screen – and which I knew to have a bug in it.

I was able to run the program in its entirety, using AID to keep an eye on the machine code sections and I successfully found the bug.

If I had been debugging the program without using the dual screen facility I could not have run the program properly, due to the program screen being corrupted each time I investigated memory or registers.



```
LINCOLN             ASSEMBLER
Microsystems        INTERACTIVE DEBUG

-------------------------------------
Status      PC  A   X   Y   S  NVDIZC
       New] 24E4  0   0   0  FC 000011
       Old] 24E4  0   0   0  FC 000011

-------------------------------------
PC ] 24E4 F5 89    ..   SBC  89   ,X
     24E6 85 72    .r   STA  72
     24E8 E8       .    INX
```

Part of a typical AID screen display

This would have meant a much longer process of testing each section separately and then checking the correctness of parameters passed between sections.

Having read this far you must be thinking: "AID can do anything!"

Unfortunately this is not quite true. For instance, AID will not output to a printer so there is no hard copy of disassembled code.

AID requires 1.5k of user RAM when the dual screen option is in use. This can pose a problem but, since it can be located anywhere between &E00 and the bottom of program screen memory, there is usually room for it somewhere.

A problem can arise if a DFS is fitted, as this occupies an area of RAM from &E00 to &1900 – this is for an Acorn DFS – as the default setting for the dual screen is &E00.

An attempt to use the DFS after initialising the dual screen may cause the system to hang up.

However I was able to successfully use discs by ensuring the dual screen memory was above &1900 and that the disc system had been reinitialised by typing *DISC.

AID also uses the RS423 buffers as workspace and variable storage. Consequently the RS423 port cannot be used with AID.

Something that I miss in the AID screen display is the value of the interrupt vector which most monitors show.

Similarly the hex dump format allows only four bytes to be displayed per row instead of the usual eight, though this gives an easier to read dump that includes an Ascii character dump.

I did encounter a few problems when using AID but these were largely due to unfamiliarity with the system.

For instance, I found that calling AID by typing *AID when I was already in AID caused the way back to Basic to be lost. Basic could only be recovered by *BASIC or control break.

Similarly, pressing break while in AID caused AID to warm start as a language ROM even if it was being used as a service ROM.

Basic is abandoned when AID is used as a language so that *BASIC or control break is the only way back to Basic. When used as a service ROM, control can be passed back to Basic from where AID was called.

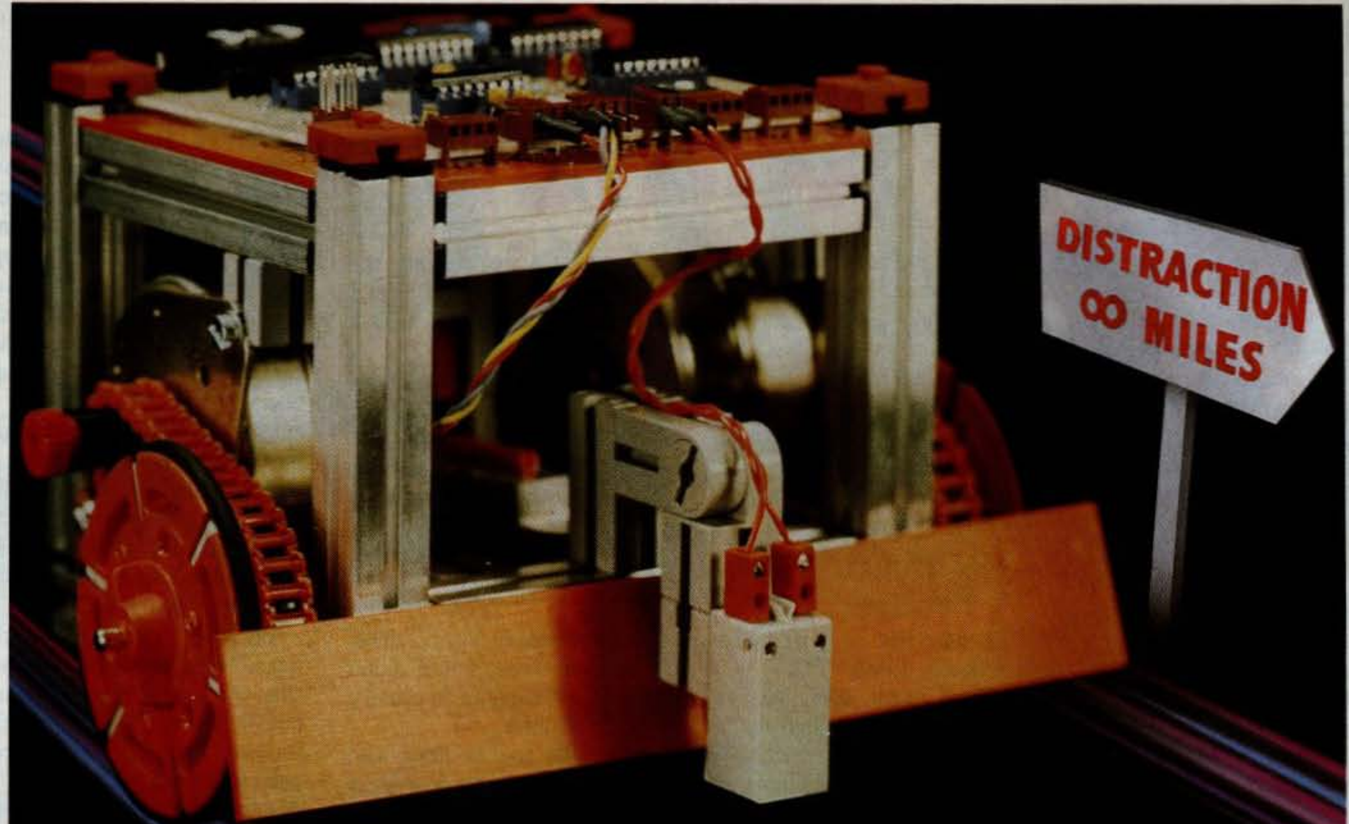
A related problem resulted when I was debugging my program that called machine code from Basic. I placed break points in the machine code expecting AID to handle them when I ran the program.

Instead, the break points caused weird error messages because Basic was in control and had no means of handling the breaks.

The correct way to allow AID to control the machine code called from Basic is to call AID instead and tell it where the code is located.

In conclusion, AID seems a must for the serious machine code programmer and a very useful learning aid for the novice. It is a highly professional product in every way and could prove to be the standard by which others are compared. It costs £28.

Eric H. Crisp



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BBC
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The Addict

By our resident analyst

PICTURE the scene, a small darkened room lit only by a television screen. Airless. Hopeless. Seated in front of it is Pete B., a drawn, emaciated man, young but prematurely old. His eyes have a vague, faraway look.

"Well," he said, glancing at me nervously and then quickly looking at the screen as if for reassurance, "it all started quite innocently."

He paused to type something into the micro.

"I was at a friend's a couple of years ago and he had one of those games machines. It was a laugh, just good fun, no harm in it."

He looked at me his expression pleading for understanding, for some contact with a fellow human being. Again he looked at the screen – it was as if he felt insecure with anything other than the micro.

"Later, I was in a pub with some friends and I started talking about it. One of them seemed to know something about it and he laughed at me, saying that games were just for kids and I ought to try something better, more adult."

Again the haunted glance, followed by the rigid gaze at the display. I noticed one of the tape cassettes which littered the room was ominously titled "Fix".

"So I went back to his place. I'd never seen anything like it, he had a couple of micros. He let me have a go and I was hooked.

"By the time I left, I had decided to buy a 1k machine. I went out and got it next morning. Oh, I know now it was nothing much but at the time it seemed great.

"Soon, however, it wasn't enough. I'd learnt all the machine code and Basic I could and I realised that I needed add-ons."

He had reached the point of no return. He had gone from software to hardware.

"I could afford it at first, but soon it got too expensive. Yet I couldn't stop. And, even then, what I had didn't satisfy me. I began to crave a real keyboard.

"Then I met a man who said he was going to start a magazine for the Beeb and why didn't I get a Beeb?

"I said I couldn't afford one and he said that it didn't matter, he'd lend me the money for one and I could repay him by doing software reviews.

"Of course, I said yes and that was it. Now it seems like there's nowhere else to go, it's all getting too much. I'm in his power, always doing reviews, getting stupid amphibians across the road. I never see anyone else except when I go to the local users' group.

"I know I should get out more and get some fresh air and I will, I really will – but I've to get this program debugged. I'll give it a rest after that. Just one more program, that's all."

Pitiable. Yet this is becoming a common occurrence in this, the age of the computer revolution. How much further on the downward path did Pete have to go? I didn't have to wonder long.

As I left, he turned to me with these words: "You couldn't let me have some money, could you? Maybe just a fiver. You see I need a second processor, I need it real bad ..."

PENGO

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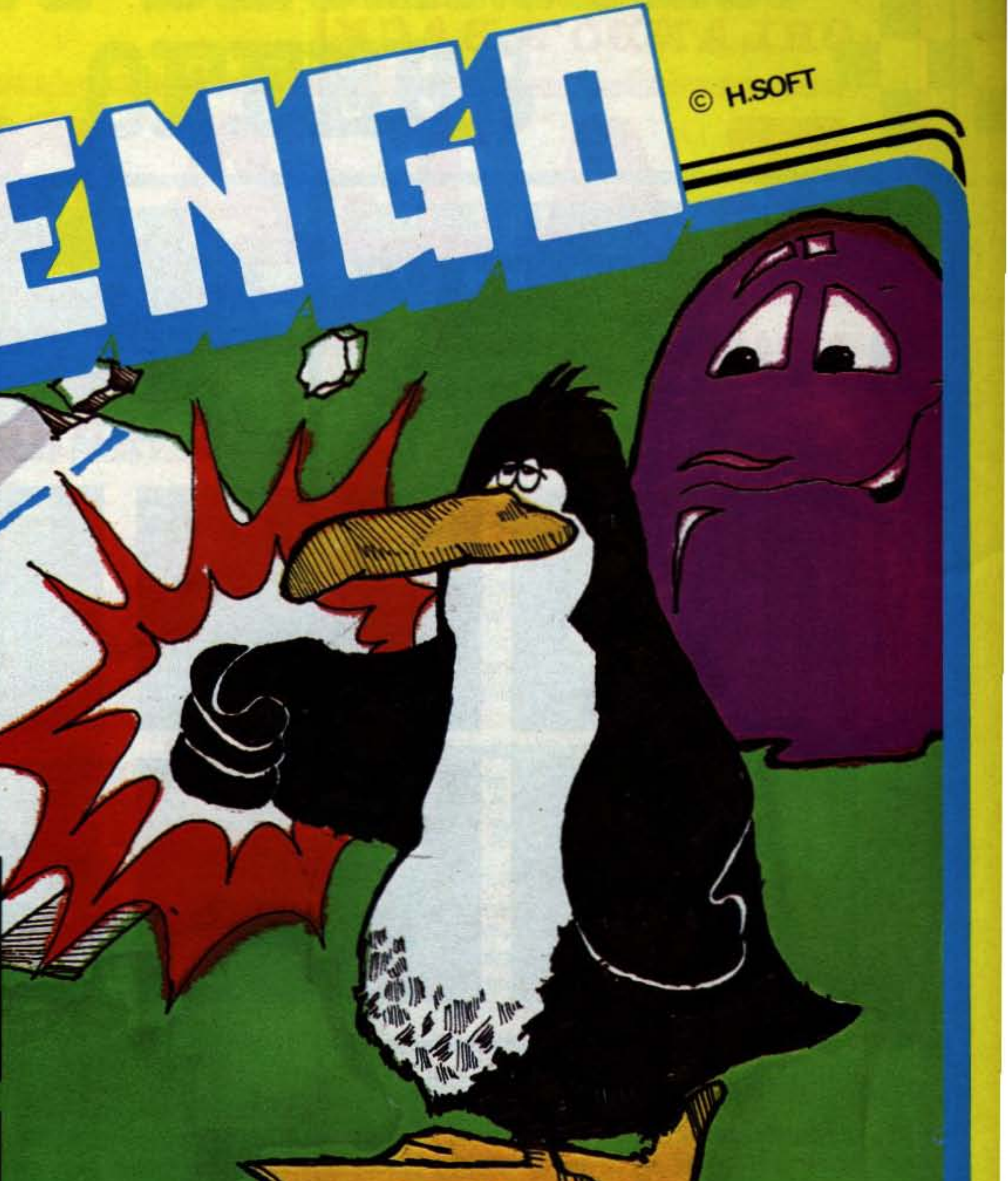

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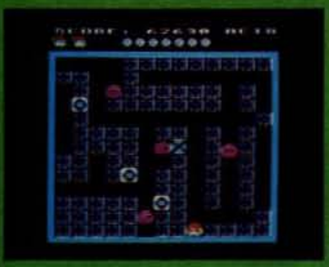

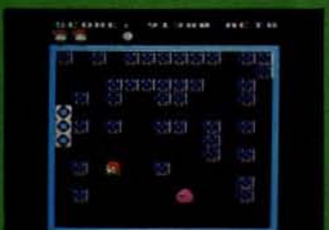

PENGO

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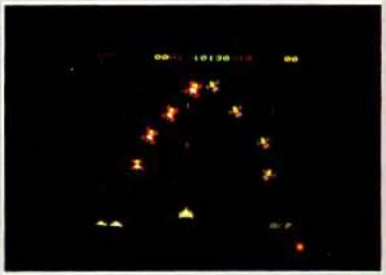

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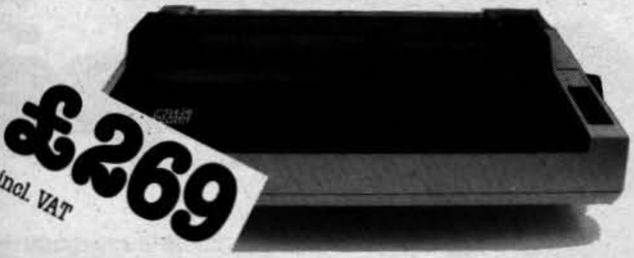

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WITH all the exercising we have been doing it is important that you don't slip your discs! This month we shall be looking at adding discs onto the BBC Micro and, hopefully, throwing some light on questions such as: *Can I do the upgrade myself? What discs should I get? And what is that double row of holes at the bottom left-hand side of the keyboard printed circuit board?*

Mind you slipped

By MIKE COOK

BACK in the very first lesson of the Body Building Course (*The Micro User, March* 1983), I mentioned we would look at upgrading to discs, so why has it taken this long?

Well those of you who have followed the progress of the BBC Micro will know that when it was stated that it would be designed by Acorn Computers, a very tight delivery date was also announced.

As we all know, production was not able to satisfy demand but by then the computer hardware was designed and so the basic configuration was fixed.

All things considered, Acorn did a marvellous job and produced the very best computer available at up-to-double the price on the market today.

Even so, like the curate's egg, there are parts of the BBC Micro which are not as well designed as they might be.

Unfortunately the disc interface is such a one. Not that it doesn't work well, but there have been one or two problems with it.

The biggest snag holding up production has been a shortfall in supplies of the P8271 disc controller chip. This is the lynch pin of the design – you just cannot use discs without it.

The P8271 chip is one of the older types of controller. Probably it was chosen because the designers were familiar with it and there wasn't enough time to look at a newer model.

I heard it rumoured that the manufacturers of the device denied it was obsolete, saying that they had not made any for a long time, were not expecting to make any more, and did not have the huge numbers the BBC Micro started to demand!

That chip is now becoming available again, but it would have been pointless to describe how to do your own upgrade when the parts were not available.

The second snag with a DIY disc upgrade has been the unique way Acorn decided to supply the software to operate the discs on eprom. Not in itself a snag, but Acorn refused to supply this chip on its own.

To get one you had to buy the full upgrade from them and, as the disc controller chip was in short supply, they were reserving what they had for customers buying the most expensive drives at the same time.

This software is normally known as the DOS (disc operating system) on other computers but in BBC Micro terms it is called the DFS (disc filing system).

As this is a very complex piece of software, it took other suppliers some time to come up with their own versions which you could buy separately.

Now that the history of the two major holdups has been explained let's see what is needed to add discs to the computer.

Two units are required. The disc interface has to be fitted inside the case of the BBC Micro and the disc drives need to be configured and attached to the computer.

The disc interface consists of 11 ICs which are shown in Table I.

The letter B on the end of some of the IC numbers is very important, as devices without this letter are identical except that their top speed is not as great and, in the disc interface circuit, they will not be fast enough.

The chips are plugged into the appropriate sockets on the main computer printed circuit board. The IC numbers are printed onto the board next to the sockets.

Make sure that link S9 (located under the picture of the acorn) is not made. If it is snip the link.

Some other links must be checked at this point and their correct positions are shown in Table II.

This assumes you already have a Model B (or have upgraded the appropriate parts) and have operating system 1.0 or later.

For more information about how to plug ICs into sockets without tears and

IC 78	P8271 disc controller.
IC 79, IC 80	7438 Quad NAND buffer.
IC 82	74LS10 triple 3-input NAND gate.
IC 81, IC 86	74LS393 dual 4-bit binary counter.
IC 83, IC 84	CD4013B dual D-Flip-Flop.
IC 85	CD4020B 14 stage binary counter.
IC 87	74LS123 Dual mono-stable.
Any sideways ROM	Disc Filing System eprom.

Table 1: ICs for the disc upgrade

S9	Open
S18	North
S19	East
S20	North
S21	2 links both horizontal
S22	North
S32	West
S33	West

On the links where there are three connections the centre and left-hand connector may be joined with the shorting link. This link is said to be "West".

Alternatively if the centre and right-hand connector are joined then the link is said to be "East".

When the three connectors are in a vertical line we talk of the links being "North" and "South".

Link S21 has four connectors in a square and so they can be joined in horizontal or vertical pairs.

Table II: Link selections for disc operation

don't get discs

THE BEEB BODY BUILDING COURSE

PART 11

which parts of the Model A to B upgrade need to be done before the disc interface can be fitted, see the March 1983 issue of *The Micro User*.

If you have an old board a few modifications will have to be carried out. To find out which issue you have, take the lid off the computer and look next to the copyright notice.

If you have a board issue 4 or later you are all right but an issue 2 or 3 will mean you have to cut a track.

Locate IC 27, which is on the left hand edge of the board about threequarters of the way up.

You might think it is labelled IC 89, but in fact that refers to the empty socket to be used for Econet.

Pin 1 is the top left hand one. We are after pin 9, so count anti-clockwise round the chip to find it (it's the second one up on the other side).

Then with your courage in both hands and a pair of cutters in the other snip off the pin.

Do not cut it too close to the IC as we need to attach a wire to the stump.

There is a track leading away from the pin to the right hand pad of a pair labelled S9. Cut this track about half-way along its length.

You can use a sharp hobby knife to make two small cuts across the track about an eighth of an inch apart. Then, again using the knife, peel away the portion of the track joining the two cuts.

Finally solder a short piece of wire from the stump of the leg on the IC to the right hand pad of S9.

Those of you who have been paying attention might think that the circuit is now the same as it was before we started hacking it about. Not so, because the track continues under IC 27 to a place where it shouldn't.

By performing this surgery pin 9 now goes only to the right hand pad of S9.

The price of the components you will need is constantly fluctuating, so we have decided not to offer them as a kit because, by shopping around you can probably get a better deal.

The disc controller chip P8271 has a list price of £49.50 in "one off" quantities but several advertisers are offering it considerably cheaper.

The cost of the other components (with the exception of the disc filing system eprom) are relatively negligible. Several dealers offer a complete upgrade kit for around £90.

The disc filing system eprom is likely to cost something in the same order as the disc controller chip.

There are several independent ones available, some of which have been reviewed in recent months.

There has appeared lately an upgrade kit enabling you to run true double density. All of the extra components are also supplied and it does not use the P8271 disc controller chip.

All the alternative disc filing systems claim to be compatible with the Acorn DFS. It must be realised that this compatibility exists only with the disc commands and the documented machine code calls.

If a software supplier insists on direct calls to the DFS it probably will not work with any filing system but Acorn's – and probably not on later versions of the Acorn DFS either.

Also by doing away with the P8271 the system will not be compatible with software that accesses this chip directly. Some software may do this for protection and so will not run if another chip has been substituted.

This is not a problem at the moment, but if the development of the BBC computer is anything like that of others it will be.

It must be remembered that copying a DFS eprom, although possible, is illegal. A great deal of effort is involved in producing one, and if the rewards of this effort are not realised then there is likely to be less quality software available in the future.

Copying must be regarded as theft.

The DFS eprom can be fitted in any of the four sideways ROM sockets located in the bottom right-hand side of the board.

With this fitted, the computer will always power up with discs selected and to use tape you must first issue the command *TAPE.

Also the variable PAGE gets set higher so less free memory is available.

Once the disc interface is fitted you can start to consider the drives themselves. There is a bewildering variety of makes and specifications.

Fortunately most drives can be made to work with the BBC Micro. Those that are not suitable are usually made to add on to the Apple or Commodore range.

Nearly all the drives will be the 5.25in size but I am told that the BBC will also

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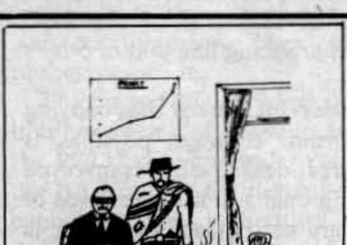

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THE BEEB BODY BUILDING COURSE

From Page 87

work with the older 8in drives.

If anybody is using this size I would be pleased to hear from them.

In addition there is the recently introduced 3in drive which works well with the BBC Micro.

As well as the size variation, you can have 35 track (this is the older type of drive) 40 track or 80 track drives. The latter are sometimes called double density, but should really be called double track density.

True double density is a function, not of the disc drive, but of the disc controller chip, and the P8271 will only support single density encoding.

Just when you thought that you had covered all the options, the extra one is that the drives can be single or double headed (sided).

The latter allows you to record on both sides of the disc, thus doubling the amount of information it will hold. This double-sided drive looks like two drives to the computer.

There are some double-sided drives which require the disc to be inserted the other way round to record on the other side. Sometimes these are known as flippy discs, as you flip them over.

However, I would strongly recommend against this practice as, when the disc is inserted the other way round the disc is moving in the opposite direction relative to the sleeve.

The inside of the sleeve of a disc has a coated surface which acts as a cleaner. Just like cleaning with velvet, when you reverse the direction, all the dirt gets wiped off the cleaner back onto the disc.

It is true that, once deposited, it then gets wiped off again, but I am sure you can see this process does nothing to extend the life of the drive head or to the disc.

Also the disc tends to lap itself into the cleaning surface and so constant change in direction will only serve to speed the wearing process.

All this does not apply to the new 3in drives as they are constructed in such a way that the disc does not contact the sleeve.

So which to choose? The answer depends on a combination of what you can afford and the use you make of your computer.

If you need a lot of large files full of data, text programs or screen dumps then an 80 track drive is worth considering.

You will then be able to store more files on each disc or have a really huge data file.

But if you only produce short to medium length files most of the time you will probably find the directory fills up before you have used half the space available on an 80 track drive.

Remember, the Acorn standard disc only allows 31 files on any one disc regardless of how small they are.

Also, as most software is supplied on 40 track discs, you could cut yourself off from a large part of the software market.

To counter that you can get a hardware switchable 40/80 track disc or, using the Watford DFS, you can software switch an 80 track drive so that it reads a 40 track disc.

I have also used this switch to write successfully on a 40 track disc with an 80 track drive, but the disc has to be formatted on a true 40 track drive.

This software switching is all right as long as the software does not require you to press SHIFT and BREAK to run a menu automatically, as pressing BREAK reverts the software switch to 80 tracks.

This can usually be overcome by *EXEC !BOOT or *RUN !BOOT. You have to experiment.

Compatibility is also a problem with the new 3in drives as very little software is available at present in that format.

The drives are very compact and neat and the discs are enclosed in a rigid box with covers, which are automatically pushed back when the disc is inserted over the access slots.

This makes the discs much less prone to the damage which results if the active surface is touched with a finger or the whole thing is sat upon.

Nothing I am sure is proof against a really determined two-year-old (I know to my cost) but the 3in discs stand a better chance than most.

With a double-sided drive you halve the running costs of your system as you only have to buy half the number of discs. However the drives themselves are more expensive and so will not start to pay for themselves for some time.

This will, of course, depend upon how quickly you fill discs. Bear in mind that the smaller number of discs takes up less space. In four years with my other computer I amassed 80 double-sided discs.

The older 35 track drives can sometimes be picked up at bargain prices, mainly because everyone wants the 40 track type.

Many of the 35 track drives will run to 40 tracks without any modification, but others may need adjusting. This can sometimes be done simply by filing off the head carriage end stop.

But it's best done by an expert otherwise you may end up with an ex-disc drive.

I think you can see the conclusion is tending towards a 40 track disc drive for software compatibility (double-sided if you can afford it) unless your particular situation calls for anything else.

Now – one drive or two? As mentioned before, the BBC computer has its disc filing system on ROM, which has both drawbacks and advantages.

The main drawback is that the filing system is very crude in the way it handles the allocation of disc space to files. This is necessitated by the limited size of the eprom – and, I suspect, lack of adequate development time.

With other computers, most of the filing system is kept on a "system disc" and the relevant part is loaded when required.

This is known as "overlaying", as one disc function is overlayed in the same RAM area as the others. It allows complex and sophisticated disc operating systems to occupy a small amount of RAM.

The disadvantage of this method is that one drive practically needs to be dedicated to the system disc and so two drives are mandatory for almost any application.

The BBC computer with its eprom-based system does not tie up a drive, and so a single drive is much more useful than it is on most computers.

Having two drives allows you to back up discs more easily. You will also avoid constant disc swapping, particularly when copying files.

But for most ordinary purposes a single drive will be adequate. I do have two, but find I seldom use the second one.

However, I have noticed a trend in some software packages, heading back to the concept of system discs. This is

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From Page 91

THE BEEB BODY BUILDING COURSE

especially true for compiled languages, which tend to have a large number of system files as well as a ROM.

The BCPL language is a case in point. If you intend to use packages like this then I would advise two drives.

Finally, some drives use the power supply in the BBC computer which can be tapped off by the socket on the underside. This is best avoided if possible.

If each drive has its own power supply the computer will not get as hot.

Also many manufacturers of add-ons are utilising this socket as a convenient source of modest current, and if you are using the socket for disc drives it isn't available for anything else.

The BBC buggy, eprom programmers and even some future Body Building projects will need this socket.

The cheapest way to buy disc drives is uncased and without power supply. You will probably find you can make a box and power supply for slightly less than the ready-built article, but you do not save all that much.

There are many makes to choose from. I don't know of any particularly poor ones, but they all differ, mainly in the type of noise they make when running. On that score I have no recommendations.

No doubt I will be inundated by dealers proclaiming the virtues of their drives or the vices of their rivals. Sometimes when a disc is inserted into a drive it does not centre properly. The computer then comes up with an error message.

The cure is to remove the disc and replace it while the motor is running. I find this is more likely to happen with horizontally mounted discs drives (the slot is horizontal) and so I prefer the vertically mounted variety.

Unfortunately the trend seems to be horizontal, mainly, I suspect, because they take up less space.

Remember the disc drive has to be connected to the computer with ribbon cable. This is normally extra, so ask when you are buying the drive.

The cable usually has a 34-way IDC (Insulation Displacement Connector) socket to plug into the computer and an edge connector to plug into the drive.

If you are making your own it should be as short as practical. For maximum reliability keep it below three feet.

You should get full instructions with the drive as they are all slightly different.

However, basically some switches or links need to be changed inside the drive to assign it a drive number and configure it for your system. There are seldom more than seven of these.

In addition, if you have two drives the terminating resistors will have to be removed from the drive nearest the computer on the cable.

These are normally all in one package that looks like an IC, although it might be electrically removed by severing just one link.

Before you are ready to go you need to set the links on the bottom right-hand side of your keyboard. See Figure I.

These decide the graphics mode of the computer on switch-on and the access time used with the discs. They are given in Table III.

You do not have to have discs to use the graphics mode links. If you are tired of Mode 7 and want a change you can select any mode.

The other links determine the step rate (how fast pulses are given to move the disc read/write head), the settling time (how long to wait before using the head after movement) and the head load time (how long to wait after selecting a drive before you can use it).

The time is in milliseconds and should not be set faster than the recommended speed for your drive.

Setting the speed slower than necessary will do no harm. You can solder links across the holes or fit a DIL (Dual-In-Line) switch. These switches are the same size as an IC.

Finally, a word to the cost-concious: Disc drives are expensive and there is not much scope for saving money except by avoiding buying more than you need.

1 indicates the link is NOT made.
0 indicates the link IS made.
Links 0 & 1 – Not used
Links 2 & 3 – Determine the disc delays.

LINK

3 2	Step rate	Settle time	Head load
1 1	240 mS	200 mS	160 mS
1 0	60 mS	500 mS	80 mS
0 1	60 mS	160 mS	0
0 0	40 mS	160 mS	0

Line 4 – Auto boot switch

LINK

4	Auto boot by pressing
1	Shift-Break
0	Break

Links 5, 6 & 7 – Determine power-up screen mode

LINK

6 5 4	Screen mode
1 1 1	Mode 7
1 1 0	Mode 6
1 0 1	Mode 5
1 0 0	Mode 4
0 1 1	Mode 3
0 1 0	Mode 2
0 0 1	Mode 1
0 0 0	Mode 0

Table III: the keyboard link options

An order form for Beeb Body Building packs is on Page 90

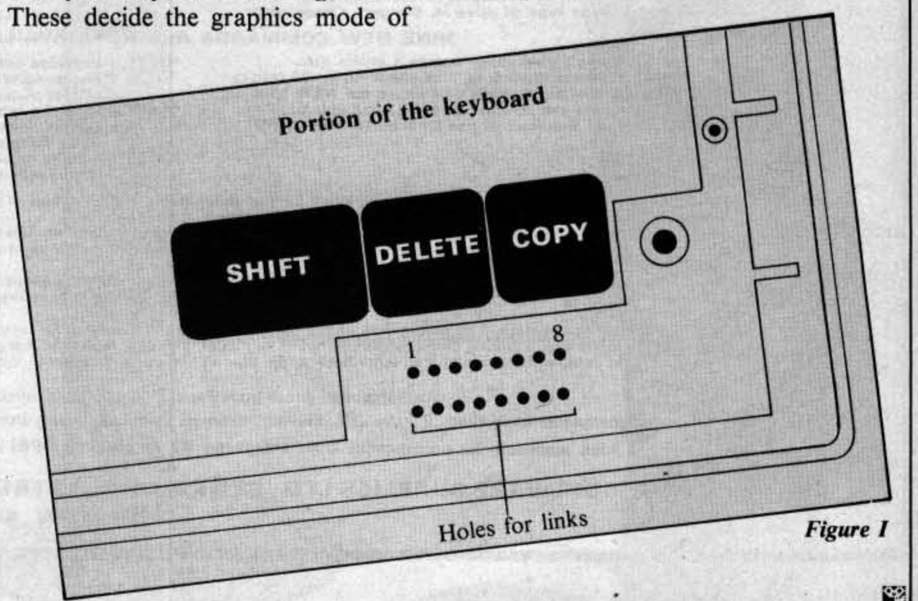

Figure I

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Access

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One of its distinct advantages against the Acorn DFS is the speed in which it handles Random Access Files (refer Benchmark figures), consequently, it can load wordwise files in approximately half the time taken by the Acorn DFS.

PRINT 1000 numbers	9.8	Move PTR 1000 places	2.9
PRINT 100 strings	56.2	Write test relative file	51.0
INPUT 1000 numbers	5.7	Read test relative file	24.2
INPUT 100 strings	22.7	Write relative file backwards	81.0
BPUT 1000 bytes	4.5	Read relative file backwards	36.0
BGET 1000 bytes	3.4		

This independent disc filing system adds greater flexibility to your BBC Computer. It has two distinct modes which auto select on booting the system. Mode zero is the standard mode which retains compatibility with presently available software. Mode one, the extended mode, allows for sixty-three file names per disc, over 100% increase on the existing DFS, and also permits the file names to be up to fifteen characters in length, providing much greater scope for meaningful file names. In both modes page is set at &1500. This gives 10% more usable memory than Acorn's DFS, in modes 0, 1 and 2. If you already have a Disc interface fitted, it is very easy to upgrade, you simply remove the DFS Eprom and replace it with the Amcom DFS Eprom, if not then it is possible to purchase an entire Disc interface kit (consists of 11 I.C.'s) with this DFS track cutting is not required. **Also includes 8 way DIL switch to allow start up options to be set.** (see below).

Link 1 Determines if the system starts up in 40 or 80 tracks
Link 2 Select Acorn or Extended mode at start-up
Link 3 & 4 Selects type of drive ie. Shugart, Canon etc.
Link 5 Select auto-boot or not, on 'break'
Link 6-8 Select screen mode on start-up, ie. model 0 to 7 etc.

NINE NEW COMMANDS ARE NOW AVAILABLE

***Clear**	**Quickly and easily erases a entire disc**
***Format**	**Formats drive 0 to 3 in either 40 or 80 tracks**
***OPT2,n**	**Alters the number of sectors per track to n**
***OPT3,n**	**Alters the number of tracks per disc to n**
***OPT5,n**	**Sets the start of the DFS buffer (see OPT7)**
***OPT6,n**	**Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address.**
***OPT7,n**	**Sets the length of the DFS buffer**
***OPT8,n**	**Double steps the disc drive to allow the reading of 40 track discs on 80 track drives**
***SYS**	**Selects either Acorn mode or Extended mode** **Commands now include *Access**

There is a built-in formatter which will format in either forty or eighty tracks in both modes of operation. This formatter also allows for user definable parameters to be included for the development of software protection.

With this disc filing system a user definable buffer can be used while compacting the disc. This will enable disc compacting to be carried out without overwriting any programme in memory. Alternatively a new disc may be formatted without any resident programme being overwritten.

This DFS also allows for the use of wildcard characters, using either the # symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).

This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programmes including printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc. Plus a utility to assist in the transfer of cassette files to disc.

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PROCselect	prints menu page and prompts key input.
PROCgraf	uses block graphics to print notes on menu page.
PROCwait	controls pauses during program run.
PROCstave	draws lines of stave and prints clef.
PROCline	centres and prints line of text.
PROCnote	prints notes of correct type on stave, with name where appropriate.
PROCsound	produces organ tone for PROCtune.
PROCtune	converts keyboard to 21-note organ and allows notes to be played, stored and replayed with visual representation on the screen.
PROCdem	displays the bass and treble staves with the positions of the notes.

Full listing starts on Page 114

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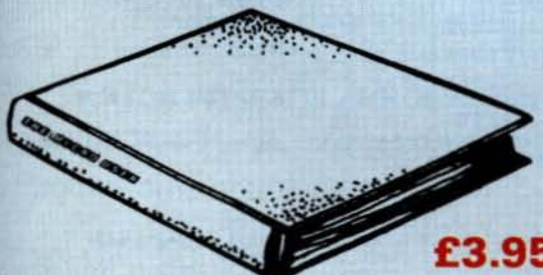

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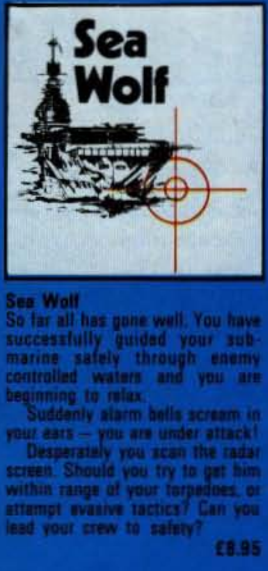

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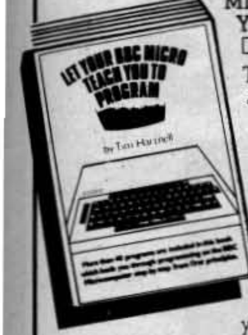

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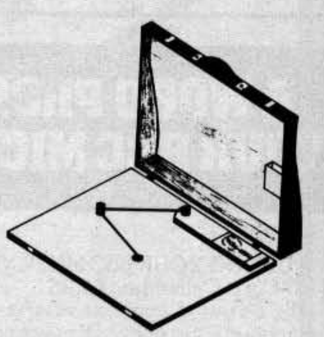

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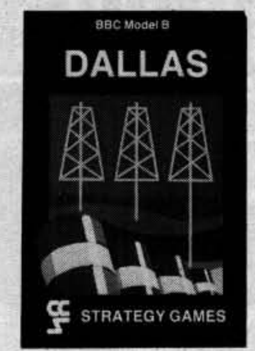
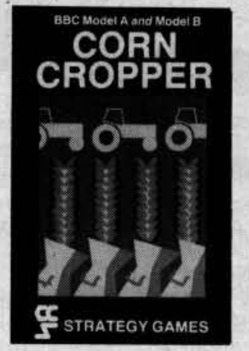


Dallas
Can you amass enough petro dollars to take over the Euing empire. Cut throat business and an eye for the main chance may get you there but you'll need nerves of steel to overcome the oil king of Dallas.



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Printing pixels

ALAN PLUME's multitone screen dump for Epson printers

THIS article presents a machine code graphics dump that will represent the colours on your screen by dot patterns on the printer. An attempt is made to preserve the aspect ratio, so that if you dump a circle it doesn't look too elliptical on your paper.

It is designed to work in modes 1, 2, 4 and 5 although because of the above constraint modes 1 and 4 look a bit chunky.

The dump is fast, a mode 2 screen being dumped in less than 2 minutes 30 seconds on a FX 80.

It is also a negative image – white on the screen is black on the paper and vice-versa, although this can be changed easily.

The colours are represented by dot patterns built up on the eight dot wires in the Epson's print head.

In modes 2 and 5 an individual pixel is made up by a 6 by 2 matrix of dots. In modes 1 and 4 just half of this matrix is used.

The data for these patterns is between lines 1530 and 1630 in the program and can be altered by the user. The colours appear in order starting at colour 0 (black – all zeroes) to colour 7 (white – all threes).

In the Basic I amendments the colour data appears at line 1870.

Figure I shows the dot patterns used. Note that this pattern data in the program is in reverse order.

The code occupies 357 bytes and can be located wherever you want to put it. For users with a DFS a good place to assemble the code is at &900 and for CFS users &C00.

Note that the code uses Basic II's 6502 pseudo-ops EQUD and EQUW. It also uses the user zero page locations.

A dump can be started either by using CALL &address after having assembled the code at &address or by using *RUN Dumper, if the machine code has been saved on to your choice of backup media by using:

```
*SAVE Dumper <start address> <end
address> <execution address>
```

For people with Basic 1 the code becomes a little messier, but the details are as follows:

Omit lines 1520 to 1630.

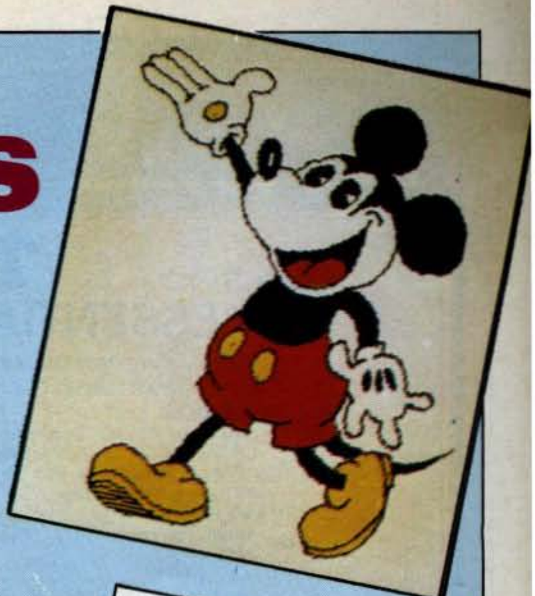
Change lines 190, 210, 250 and 270 to:

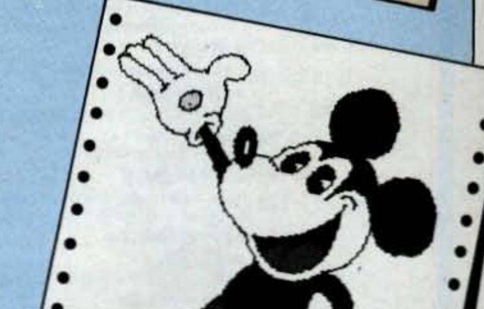
```
190 LDA #(S%+346) MOD 256
210 LDA #(S%+346) DIV 256
250 LDA #(S%+292) MOD 256
270 LDA #(S%+292) DIV 256
```

Then add line 85

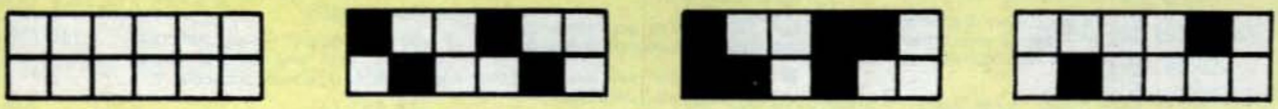
```
85 wrkspce = S%+292
```

The data can now be added to the bottom of the program.





```
1800 data=P%
1810 FOR I%=1TO 6 :?data=0
     :data=data+1 :NEXT
1820 FOR I%=0TO 7
     :READ Colour$
1830 FOR B%=1TO 6
     :?data=VAL (MID$(Colour$,B%
     ,1))
1840 data=data+1:NEXT
1850 FOR I%=1TO 11 :READ B%
     :?data=B%
1860 data=data+1:NEXT
1870 DATA 000000,021021,013023,010020
     ,313323,232131,212121,333333
1880 DATA 27,65,8,27,76,192,3,27
     ,127,27,7
```

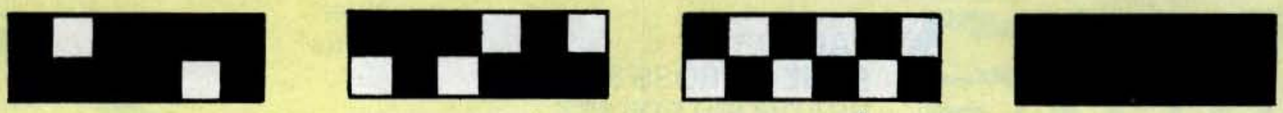


Colour 0 (Black)

Colour 1 (Red)

Colour 2 (Green)

Colour 3 (Yellow)



Colour 4 (Blue)

Colour 5 (Magenta)

Colour 6 (Cyan)

Colour 7 (White)

Figure I: The dot patterns for each colour

STAR PRODUCTS FROM PACE!

TOOLSTAR – AN ESSENTIAL UTILITY FOR THE BBC MICRO

This exciting new toolkit ROM offers many extra facilities and will significantly reduce program development time. The new commands offered by Toolstar are:

★ FIND
Search a BASIC program for all occurances of the specified string (mixed tokens/ASCII), and list all lines with string highlighted.

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★ FKEY
Display what is behind function keys in a format suitable for on-screen editing.

★ RESET
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★ REPLACE
Selective replacement of one string by another in a BASIC program, including wild card options.

★ FLIST
List a 'Bad Program' with suspicious areas highlighted.

★ FIX
Repair a 'Bad Program' then list it.

★ CONV
Convert between Decimal, Hexadecimal and Binary in any combination.

★ DVERIFY Verify a disc.

★ DLOAD
Load the data from the specified sector on a disc to memory.

★ EXTEND
Expands the Toolstar to encompas RAM based utilities which then automatically appear under the **★ HELP** command. This feature ensures that Toolstar is capable of future expansion.

★ DSAVE
Save the data from memory to a specified area on the disc.

The following commands are directed at the whole machine memory and complement the BBC micro's assembler:

★MROM
All the M (Memory) commands can be directed at the specified paged ROM. eg. BASIC, DFS, TOOLSTAR, WORDWISE, etc.

★ MDUMP
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★ MSEED
Fill the specified memory area with any value.

★MCOMP
Compare memory areas and list those where memory contents are not the same.

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★ MDIS
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★ MFIND
Search memory for all occurances of specified machine code/ASCII string.

★ MCOPY
Smart memory copy from one area to another.

★ MCRC
Calculate a Cyclic Redundancy Check for the specified memory area.

Any or all of the above commands can be used from within a BASIC program. This allows the user to develop many powerful utilities (ie. disc doctor etc.)
Also included are **★HELP** menus with a list of the above commands and their correct syntax.
Toolstar comes complete with a most comprehensive manual including many program examples.

ONLY £34.00 inc. VAT.

COMMSTAR – ROM BASED INTELLIGENT COMMUNICATIONS FACILITY

Commstar is a unique intelligent communications facility, developed by Andy Hood, for the BBC micro. It will allow communication with other computer users and allow access to Prestel and other large data bases throughout the world via a suitable modem.
Commstar is extremely flexible, allowing full configuration of the RS 423 (RS 232) part of the BBC micro, full XON/XOFF protocol, and 'safe' file transfer by the use of enhanced 'Christiensen' protocols.
All commands are easily accessed from a main menu from which it is a simple matter to toggle into 'chat' mode (and vice-versa).

Menu options available are:

B — Copy to buffer on/off: All input from the host may be copied into a memory buffer which is approx, 23K in mode 7.

L — Load buffer from current filing system file for transmission to modem.

S — Save buffer to current filing system file for 'browsing' later.

V — View current buffer contents on screen — display speed may be varied, or paused with optional dumping to printer.

T — Toggle screen mode : normally mode 7, 80 columns available in mode 3.

O — Output buffer to modem — speed may be varied to suit particular modem speeds.

M — Issue any MOS command from within COMMSTAR eg. *FX8,3 (ie set RS423 baud rate).

C — Exit menu to 'chat' mode to allow conversational access to bulletin boards.

W — Wipe buffer prior to use of other buffer commands if necessary.

E — Echo on/off — set echo on when using host terminals which do not provide an echo.

X — Toggle XON/XOFF protocol.

R — Reset buffer pointers.

I — Initialise RS423 port for word length, parity and stop bits.

F — File transfer using XMODEM protocols. High integrity via use of enhanced 'Christiensen' protocols.

Commstar also contains its own software clock in memory which is useful in displaying length of log-on time etc.

Details of the above products can be obtained from your nearest BBC dealer or direct from:

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92 NEW CROSS STREET,
BRADFORD BD5 8BS.
Tel: (0274) 729306 Telex: 51564

Printing pixels listing

From Page 103

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
10 MODE 7
20 PRINT ''''"Give address for origi
   n of assembler in hexadecimal,
    that is preceded by &."
30 INPUT A$
   :S%=EVAL (A$)
40 xlo=&70
   :xhi=&71
   :ylo=&72
   :yhi=&73
50 logcol=&74
   :physcol=&75
   :step=&8F
60 osbyte=&FFF4
   :osword=&FFF1
   :oswrch=&FFEE
70 prtbyte=&76
   :ptr=&77
   :byte=&7A
80 base=&7F
   :data=&79
90 FOR pass=0TO 3 STEP 3
100 P%=S%
110 [OPT pass
120 LDA #29
130 JSR oswrch
140 LDA #0
150 LDX #4
160 .repeat JSR oswrch
170 DEX
180 BNE repeat
190 LDA #init MOD 256
200 STA data
210 LDA #init DIV 256
220 STA data+1
230 LDA #2
   :JSR oswrch
240 LDX #0
250 LDA #wrkspce MOD 256
260 STA xlo
270 LDA #wrkspce DIV 256
280 STA xhi
290 .label LDA xlo
300 CLC
310 ADC #6
320 STA xlo
330 STA base,X
340 INX
350 BCC carryclr
360 INC xhi
370 .carryclr LDA xhi
380 STA base,X
390 INX
400 CPX #16
410 BCC label
420 LDA #&FF
430 STA ylo
440 LDA #&3
450 STA yhi
460 LDA #135
470 JSR osbyte
480 CPY #3
490 BCS modegt3
500 INY
510 .modegt3 TYA
520 ROR A
530 BCS mode2or5
540 .mode1or4 LDA #4
550 STA wrkspce+5
560 LDA #2
570 STA step
580 BNE linespc
590 .mode2or5 LDA #8
600 STA wrkspce+5
610 LDA #5
620 STA step
630 .linespc LDY #0
   :LDX #3
640 JSR prtinst
650 .bitimage LDA #0
660 STA xlo
670 STA xhi
680 LDY #3
   :LDX #4
690 JSR prtinst
700 .newcol LDX #4
710 .readpix TXA
   :PHA
720 LDX #xlo
730 LDY #0
740 LDA #9
750 JSR osword
760 LDA #&B
770 LDY #0
780 LDX #logcol
790 JSR osword
800 PLA
   :TAX
810 LDA physcol
820 AND #7
830 ASL A
840 STA byte,X
850 LDA ylo
860 SEC
870 SBC #4
880 STA ylo
890 BCS chkcolend
900 DEC yhi
910 .chkcolend DEX
920 BNE readpix
930 LDY step
940 .back LDA #0
950 STA prtbyte
960 LDX #4
970 .pixel TXA
   :PHA
980 LDA byte,X
990 TAX
1000 LDA base,X
1010 STA ptr
1020 LDA base+1,X
1030 STA ptr+1
1040 LDA (ptr),Y
1050 CLC
1060 ADC prtbyte
1070 STA prtbyte
1080 PLA
   :TAX
1090 DEX
1100 BEQ print
1110 ASL prtbyte
1120 ASL prtbyte
1130 BCC pixel
1140 .print LDA prtbyte
1150 JSR sendprt
1160 DEY
1170 BPL back
1180 .nxtcol CLC
1190 LDA wrkspce+5
1200 ADC xlo
1210 STA xlo
1220 BCC chklnend
1230 INC xhi
1240 .chklnend LDA xhi
1250 CMP #5
1260 BEQ endline
1270 .coltop LDA #16
1280 CLC
1290 ADC ylo
1300 STA ylo
1310 BCC newcol
1320 INC yhi
1330 BCS newcol
1340 .endline LDA #10
1350 JSR sendprt
1360 .endcheck LDA yhi
1370 BMI end
1380 JMP bitimage
1390 .prtinst LDA (data),Y
1400 JSR sendprt
1410 INY
    :DEX
1420 BNE prtinst
1430 RTS
1440 .sendprt PHA
    :LDA #1
1450 JSR oswrch
1460 PLA
    :JSR oswrch
1470 RTS
1480 .end LDY #7
    :LDX #4
1490 JSR prtinst
1500 LDA #3
    :JSR oswrch
1510 RTS
1520 .wrkspce EQUD &00000000
    :EQUW &0000
1530 .colours EQUD &00000000
    :EQUW &0000
1540 EQUD &00010200
    :EQUW &0102
1550 EQUD &00030100
    :EQUW &0302
1560 EQUD &00000100
    :EQUW &0002
1570 EQUD &03030103
    :EQUW &0302
1580 EQUD &01020302
    :EQUW &0103
1590 EQUD &01020102
    :EQUW &0102
1600 EQUD &03030303
    :EQUW &0303
1610 .init EQUD &1B08411B
1620 EQUD &1B03C04C
1630 EQUD &00071B7F
1640 ]
1650 NEXT
```

This listing is included in this month's cassette tape offer. See order form on Page 97 of The Micro User.

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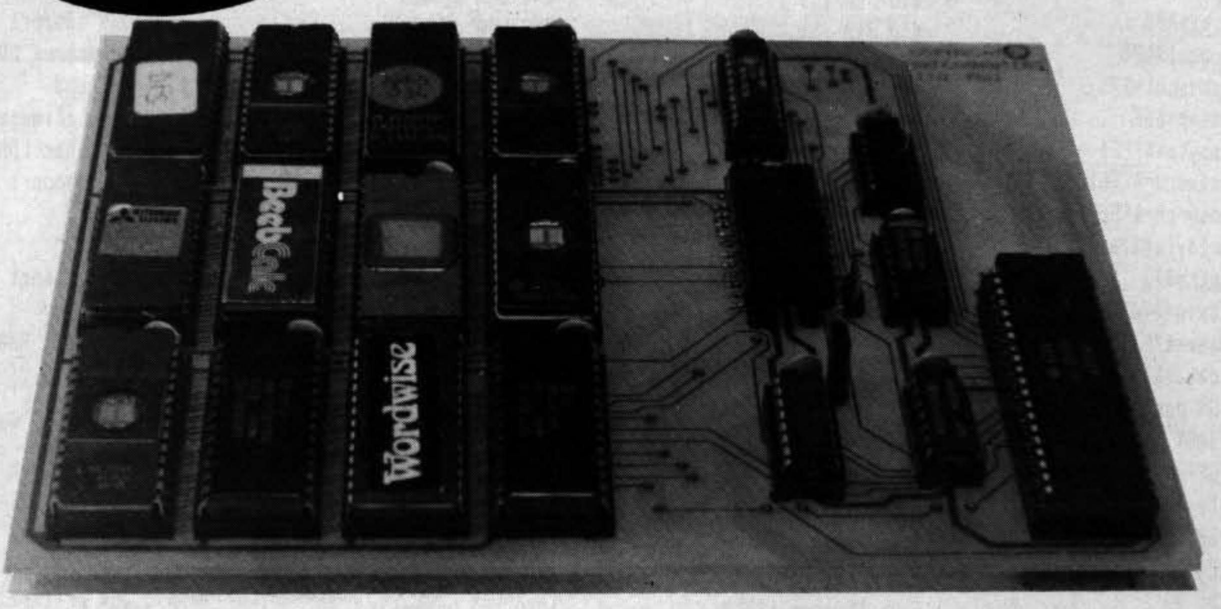

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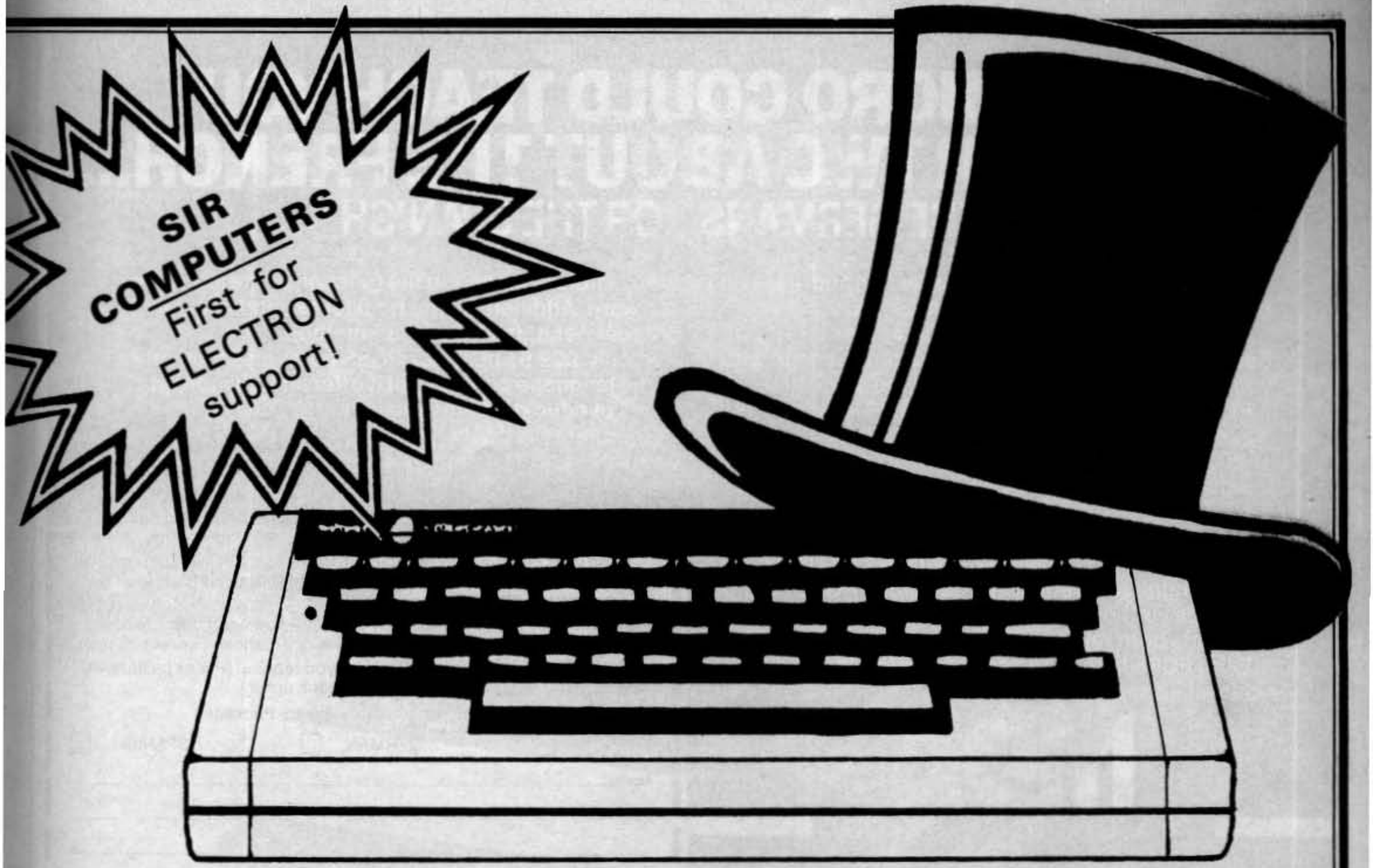

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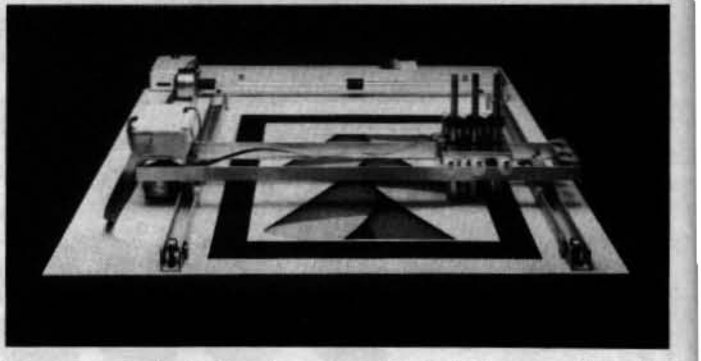

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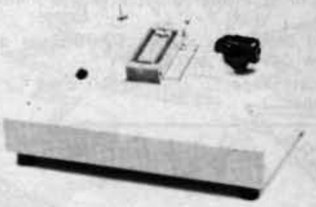

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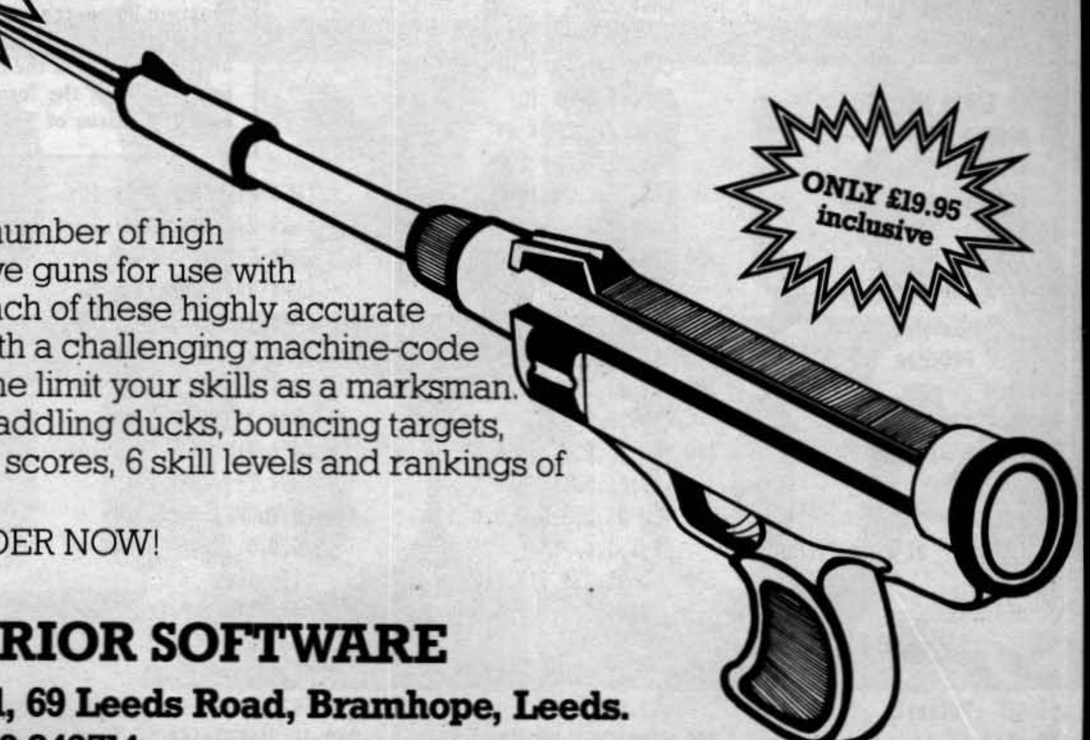

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Noteplay listing

From Page 95

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
 10 REM "NOTEPLAY"
 20 REM A.Phillips
 30 REM (C) The Micro
     User
 40 ON ERROR GOTO 80
 50 MODE 7
    :PROCinit
    :PROCselect
 60 MODE 1
    :VDU 19,0,4;0;
 70 IF M%=49 PROCtune

    ELSE PROCdem
    :RUN
 80 ON ERROR OFF
 90 IF ERR =17 RUN
100 MODE 7
    :REPORT
    :PRINT " at line ";ERL
110 *FX4
120 *FX12
130 END
140
150 DEF PROCinit
160 *FX4,1
170 *FX11
180 VDU 23,224,60,114
    ,225,193,131,135,78
    ,60
190 VDU 23,225,1,1,1,1
    ,1,1,1,1
200 VDU 23,226,1,1,1,0
    ,0,0,0,0
210 VDU 23,227,128,128
    ,128,128,128,128,128
    ,128
220 VDU 23,228,0,0,0,0
    ,0,128,128,128
230 VDU 23,229,60,126
    ,255,255,255,255,126
    ,60
240 Nch1$=CHR$ 224+
    CHR$ 8+CHR$ 226+
    CHR$ 8+CHR$ 11+
    CHR$ 225+CHR$ 8+
    CHR$ 11+CHR$ 225+
    CHR$ 8+CHR$ 11+
    CHR$ 225
250 Nch2$=CHR$ 224+
    CHR$ 8+CHR$ 228+
    CHR$ 8+CHR$ 10+
    CHR$ 227+CHR$ 8+
    CHR$ 10+CHR$ 227+
    CHR$ 8+CHR$ 10+
    CHR$ 227
260 Nch3$=CHR$ 229+
    CHR$ 8+CHR$ 226+
    CHR$ 8+CHR$ 11+
    CHR$ 225+CHR$ 8+
    CHR$ 11+CHR$ 225+
    CHR$ 8+CHR$ 11+
    CHR$ 225
270 Nch4$=CHR$ 229+
    CHR$ 8+CHR$ 228+
    CHR$ 8+CHR$ 10+
    CHR$ 227+CHR$ 8+
    CHR$ 10+CHR$ 227+
    CHR$ 8+CHR$ 10+
    CHR$ 227
280 VDU 23,230,3,4,8,8
    ,8,8,10,7
290 VDU 23,231,192,224
    ,112,59,59,56,56,56
300 VDU 23,232,2,0,0,0
    ,0,0,0,0
310 VDU 23,233,56,56,59
    ,59,56,56,56,56
320 VDU 23,234,0,0,0,0
    ,1,1,3,6
330 VDU 23,235,112,112
    ,224,192,192,128,0
    ,0
340 VDU 23,236,4,8,16
    ,32,0,0,0,0
350 Bch$=CHR$ 230+CHR$ 231+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 232+CHR$ 233+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 234+CHR$ 235+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 236
360 VDU 23,240,0,1,3,3
    ,2,2,2,2
370 VDU 23,241,128,192
    ,192,64,64,64,64,64
380 VDU 23,242,2,2,2,2
    ,2,2,3,1
390 VDU 23,243,64,64,64
    ,64,64,64,192,192
400 VDU 23,244,3,7,15
    ,29,57,113,225,193
410 VDU 23,245,128,0,0
    ,0,0,0,0,0
420 VDU 23,246,195,199
    ,204,216,208,208,208
    ,200
430 VDU 23,247,224,240
    ,152,140,134,134,134
    ,134
440 VDU 23,248,196,98
    ,48,24,12,6,3,1
450 VDU 23,249,134,134
    ,134,132,136,144,160
    ,192
460 VDU 23,250,0,16,56
    ,16,32,17,10,4
470 VDU 23,251,128,128
    ,128,128,128,0,0,0
480 Tch$=CHR$ 240+CHR$ 241+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 242+CHR$ 243+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 244+CHR$ 245+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 246+CHR$ 247+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 248+CHR$ 249+
    CHR$ 8+CHR$ 8+CHR$ 10+
    CHR$ 250+CHR$ 251
490 ENVELOPE 1,0,0,0,0
    ,0,0,0,126,-4,0,-1
    ,126,100
500 DIM Y%(21),Pitch%(21)
    ,Note$(21),P$(5),Nstore
    $(100)
    :G%=FALSE
510 IF ?&FFFE=164
    THEN Q%=&DB
    ELSE Q%=&25A
520 ENDPROC
540 DEF PROCselect
550 ?Q%=&20
560 FOR I%=1TO 2
    :PRINT TAB(11,I%)
    CHR$ 141CHR$ 130"**
     NOTEPLAY **"
    :NEXT I%
570 PRINT TAB(12,3)
    CHR$ 130;STRING$(14
    ,"_")
580 PROCgraf(147,33,3)
590 PRINT TAB(12,7)
    CHR$ 134;"1. Play a
     Tune";TAB(8,10)
    CHR$ 134;"2. Notes
     of the Staves"
600 PRINT TAB(4,15);
    CHR$ 132;CHR$ 157;
    CHR$ 131;"Press 1 or
     2 then";CHR$ 135;
    CHR$ 157;CHR$ 132;
    "RETURN  ";CHR$ 156
610 PROCgraf(149,1,19)
620 PRINT TAB(13,21)
    CHR$ 135"PLEASE SELECT:
    ";CHR$ 134;
    :*FX15,1
630 REPEAT
    :M%=GET
    :UNTIL M%=49 OR M%=50
640 Move%=0
650 ENDPROC
660
670 DEF PROCgraf(C,X,Y)
680 B=154
690 PRINT TAB(X,Y)CHR$ B;
    CHR$ C" ?/5"
700 PRINT TAB(X,Y+1)
    CHR$ B;CHR$ C" 5 5"
710 PRINT TAB(X,Y+2)
    CHR$ B;CHR$ C" 5_5"
720 PRINT TAB(X,Y+3)
    CHR$ B;CHR$ C"85-!"
730 PRINT TAB(X,Y+4)
    CHR$ B;CHR$ C"£"
740 ENDPROC
750
760 DEF PROCwait(W%)
770 TIME =0
    :REPEAT UNTIL TIME >=W%
780 ENDPROC
790
800 DEF PROCstave(Cleff$
    ,Sname%)
810 VDU 5,18,0,1
820 B%=500+Move%
830 FOR J%=1TO 5
840 MOVE 8,B%
850 DRAW 1260,B%
860 B%=B%-36
870 NEXT J%
880 DRAW 1260,500+Move%
890 MOVE 4,500+Move%
    :DRAW 4,356+Move%
900 GCOL 0,2
910 IF Cleff$=Tch$
    THEN MOVE 16,522+Move%

    ELSE MOVE 16,492+Move%
920 PRINT Cleff$
930 IF Sname% ENDPROC
940 IF Cleff$=Tch$
    THEN a$="Treble Stave"

    ELSE a$="Bass Stave"
950 IF Move%=0
    THEN x%=24
    ELSE x%=13
960 PROCline(2,a$,x%)
970 ENDPROC
980
990 DEF PROCline(c%,Line$
```

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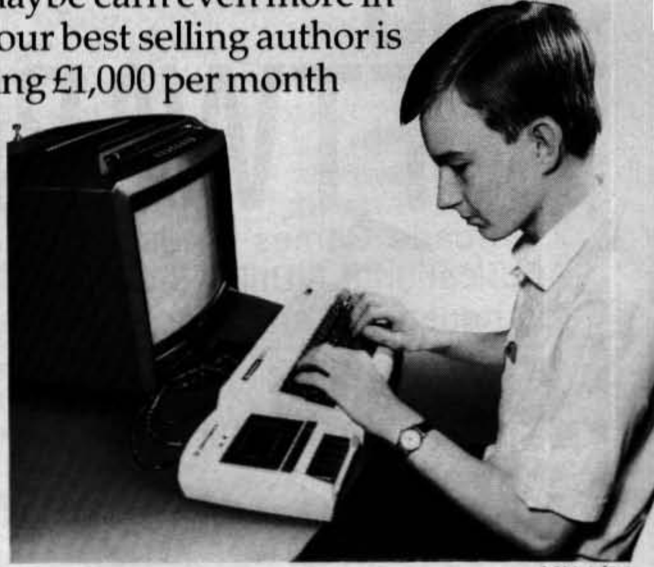

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Noteplay listing

From Page 114

```
     ,y%)
1000 VDU 4,17,c%
1010 x%=(40-LEN (Line$))/2
1020 PRINT TAB(x%,y%)Line$
1030 VDU 17,128,5
1040 ENDPROC
1050
1060 DEF PROCnote(Z%,Nname%
     ,Ntype%)
1070 IF G%=FALSE GOTO 1120
1080 IF T%=49 AND Del%

     THEN Del%=FALSE
     :Ntot%=Ntot%-1
     ELSE ENDPROC
1090 IF X%>168
     THEN X%=X%-64
     ELSE ENDPROC
1100 IF Z%=0
     THEN MOVE X%,760
     :PRINT "-"
     ELSE MOVE X%,Y%(Z%)+Mov
     e%
     :PRINT N$
1110 ENDPROC
1120 IF Z%=0 MOVE X%,760
     :PRINT "-"
     :GOTO 1220
1130 IF Ntype% GOTO 1160
1140 IF Y%(Z%)+Move%>442+Mov
     e%
     THEN N$=Nch2$
     ELSE N$=Nch1$
1150 GOTO 1170
1160 IF Y%(Z%)>442
     THEN N$=Nch4$
     ELSE N$=Nch3$
1170 MOVE X%,Y%(Z%)+Move%
     :PRINT N$
1180 IF Nname% GOTO 1200
1190 MOVE X%,320+Move%
     :PRINT Note$(Z%)
1200 IF Ntype% GOTO 1220
1210 SOUND 1,1,Pitch%(Z%)
     ,10
1220 IF M%=49
     THEN X%=X%+64
     ELSE X%=X%+128
1230 Del%=TRUE
1240 ENDPROC
1250
1260 DEF PROCsound
1270 SOUND &11,-15,Pitch%(D%
     ),8
1280 SOUND &12,-15,Pitch%(D%
     )-48,8
1290 SOUND &13,-15,Pitch%(D%
     )+48,8
1300 ENDPROC
1310
1320 DEF PROCtune
1330 LOCAL NT$,G$,D%,Ntot%
     ,Rtot%,Del%
1340 RESTORE 1930
     :FOR I%=1TO 21
     :READ Y%(I%),Note$(I%)
     ,Pitch%(I%)
     :NEXT I%
1350 NT$="QAWSEDRFTGYHUJIKOL
     P;@"
1360 REPEAT
     :VDU 12
1370 ?0%=&20
     :*FX15,0
1380 PROCline(2,"TO PLAY
      A TUNE...PRESS 1"
     ,5)
     :PROCline(1,"TO PLAY
      IT BACK...PRESS 2"
     ,10)
     :PROCline(3,STRING$(12
     ,"*"),14)
1390 REPEAT
     :T%=GET
     :UNTIL T%=49 OR (T%=50
      AND Ntot%>1)
1400 IF T%=50 GOTO 1450
1410 PROCline(2,"    Press
      these      to play
      a tune:",21)
     :PROCline(129,"KEYS"
     ,21)
1420 PROCline(129,"Q W E
      R T Y U I O P @"
     ,24)
     :PROCline(129,"A S
      D F G H J K L ;"
     ,27)
     :PROCline(3,"rest>
        replay>        >
        ",30)
1430 VDU 4,17,2,17,129
     :PRINT TAB(11,30)"Z"
     :PRINT TAB(21,30)"SPACE
     "
     :PRINT TAB(30,30)"DELET
     E"
     :VDU 17,128
1440 PROCline(3,"note:
      g b d f a c e g b
      d f        ",25)
     :PROCline(3,"a c e
      g b d f a c e",28)
     :GOTO 1480
1450 PROCline(2,"Press F
      for fast    ",17)
     :PROCline(1,"  S for
      slow",19)
1460 REPEAT
     :Spd%=GET AND 223
     :UNTIL Spd%=70
     OR Spd%=83
     :IF Spd%=70
     THEN Spd%=30
     ELSE Spd%=60
1470 PROCline(2,"REPLAY"
     ,25)
1480 VDU 24,0;384;1278;1000;
1490 Rtot%=1
     :IF T%=49
     THEN Ntot%=1
1500 REPEAT
1510 Move%=304
     :VDU 12
     :PROCstave(Tch$,
     TRUE )
1520 Move%=80
     :PROCstave(Bch$,
     TRUE )
1530 GCOL 0,1
     :MOVE 8,616
     :DRAW 1260,616
1540 X%=168
     :GCOL 3,3
1550 REPEAT
1560 G%=FALSE
1570 REPEAT
1580 IF T%=49
     THEN G$=GET$
     ELSE G$=Nstore$(Rtot%)
1590 IF G$=" " GOTO 1620
1600 IF ASC (G$)=127
     AND Ntot%>1
     THEN G%=TRUE
     :GOTO 1620
1610 D%=INSTR(NT$,G$)
1620 UNTIL D%<>0 OR G$=
     "Z"OR G$=" " OR G%
1630 IF G$=" " GOTO 1710
1640 IF G% OR G$="Z"
     GOTO 1670
1650 IF D%>12
     THEN Move%=304
     ELSE Move%=80
1660 PROCsound
1670 PROCnote(D%,TRUE
     ,TRUE )
1680 IF G% GOTO 1710
1690 IF T%=50
     THEN Rtot%=Rtot%+1
     :PROCwait(Spd%)
     :GOTO 1710
1700 Nstore$(Ntot%)=G$
     :Ntot%=Ntot%+1
     :IF Ntot%>100
     THEN Rtot%=Ntot%
1710 UNTIL X%=1256 OR G$=
     " "OR (Rtot%=Ntot%
      AND G%=FALSE )
1720 UNTIL G$=" " OR (Rtot%=
     Ntot% AND G%=FALSE )
1730 VDU 26
1740 UNTIL FALSE
1750 ENDPROC
1760
1770 DEF PROCdem
1780 Move%=344
     :PROCstave(Tch$,
     FALSE )
1790 PROCwait(150)
1800 Move%=0
     :PROCstave(Bch$,
     FALSE )
1810 PROCwait(150)
1820 VDU 19,3,0;0;18,0
     ,3
1830 FOR I%=1TO 2
1840 X%=172
1850 IF I%=2
     THEN RESTORE 1950
     :Move%=344
     ELSE RESTORE 1930
1860 FOR J%=1TO 9
     :READ Y%(J%),Note$(J%)
     ,Pitch%(J%)
     :NEXT J%
1870 FOR K%=1TO 9
1880 PROCnote(K%,FALSE
     ,FALSE )
1890 PROCwait(200)
1900 NEXT K%
     :NEXT I%
1910 PROCwait(1000)
1920 ENDPROC
1930 DATA 370,G,33,388
     ,A,41,406,B,49,424
     ,C,53,442,D,61,460
     ,E,69,478,F,73,496
     ,G,81,514,A,89
1940 DATA 532,B,97,550
     ,C,101,568,D,109
1950 DATA 370,E,117,388
     ,F,121,406,G,129,424
     ,A,137,442,B,145,460
     ,C,149,478,D,157,496
     ,E,165,514,F,169
```

This listing is included in this month's cassette tape offer. See order form on Page 99.

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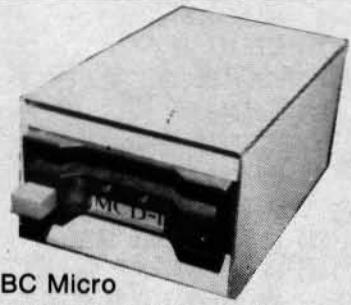

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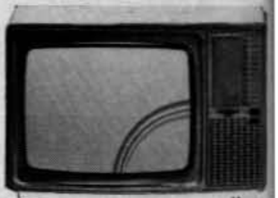

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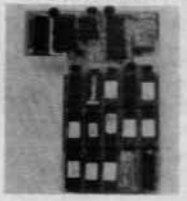

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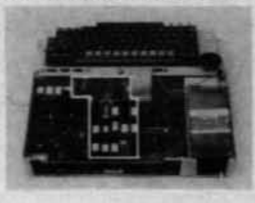

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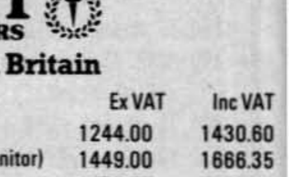

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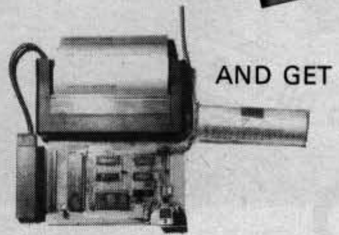

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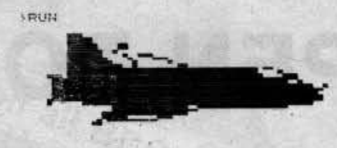

```
  LIST
  10 LET A%=-1
  20 REPEAT
  40 IF A%=-1 THEN 70
  50  PRINT CHR$(255-(A%-160));
  60 GOTO 100
  70 PRINT
  80 PRINT "  ";CHR$(151);
 100 READ A%
 110 UNTIL A%=-99
 120 END
1000 DATA 255,255,160,162,235,
 1
```

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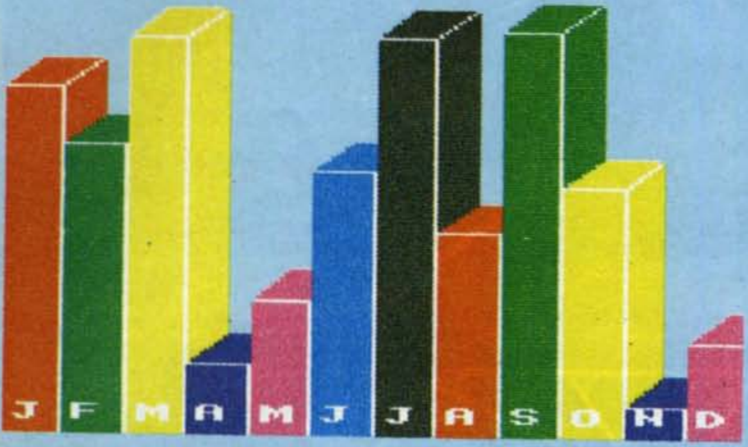
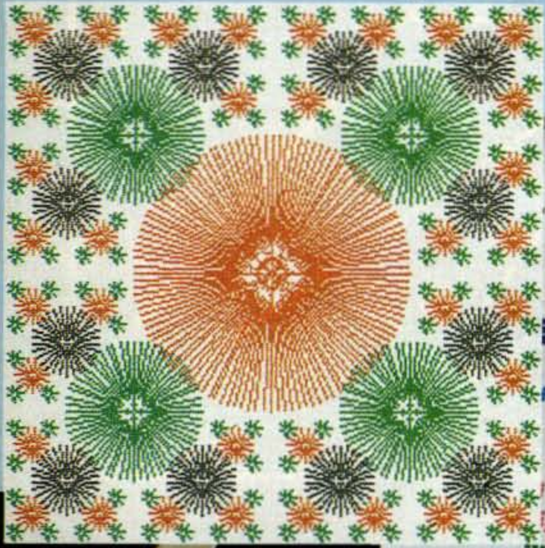


from BBC Micro screen – ½ size mode



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Barrel Battle listing

From Page 57

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
1 REM *** BARREL BATTLE
  ***
2 REM ********************
  **
3 REM *** BY B. WAKELIN
  ***
4 REM *** (c)Micro User
  ***
5 DATA 115,2,100,5,115
  ,2,100,5,75,2,60,3
  ,60,2,75,3,75,2,60
  ,3
6 ENVELOPE 1,1,0,0,0
  ,0,0,0,127,-4,-3,-2
  ,126,0
  :ENVELOPE 2,1,50,-30
  ,10,100,-50,5,127
  ,-5,-4,-2,126,0
  :ENVELOPE 3,2,0,-25
  ,75,5,100,-10,127
  ,-4,-2,-1,126,0
  :ENVELOPE 4,1,5,5
  ,5,-2,-4,-6,127,0
  ,-4,-3,126,0
7 VDU 23,224,60,102
  ,255,165,165,255,102
  ,60,23,225,66,126
  ,66,66,66,126,66,66
  ,23,226,255,126,60
  ,24,24,60,126,255
  ,23,227,60,126,90
  ,255,61,24,38,96,23
  ,228,60,126,90,255
  ,188,24,100,6,23,229
  ,60,126,90,255,60
  ,24,102,0
8 VDU 23,231,126,195
  ,36,60,102,126,255
  ,195,23,232,0,0,0
  ,0,0,32,118,255,23
  ,233,0,102,24,60,255
  ,90,126,60,23,255
  ,255,255,255,255,255
  ,255,255,255,23,230
  ,0,0,8,222,125,62
  ,28,0
9 TP%=0
  :S%=0
  :DIM A%(2),B%(2),D%(2)
  ,E%(2),O%(2),T%(2)
  ,R%(2),Q%(2),F%(2)
10 BA%=2
  :L%=1
  :W%=1
  :GOSUB 84
  :LIV%=3
  :S%=0
  :MODE 2
11 COLOUR 130
  :PRINT TAB(0,30);"
      "
  :COLOUR 3
  :ON L%GOSUB 65 ,68
  ,76 ,80
12 COLOUR 12
  :COLOUR 128
  :PRINT TAB(3,0);"BARREL
   BATTLE"
  :COLOUR 1
  :PRINT TAB(0,2);"SCORE
   ";S%;TAB(12,2);"SHEET
   ";L%
13 VDU 5
  :GCOL 0,C%
  :MOVE 0,31
  :PRINT STRING$(20
  ,CHR$ 255)
  :GCOL 0,3
  :MOVE 0,31
  :PRINT STRING$(20
  ,CHR$ 226)
  :VDU 4
14 A%(0)=5
  :A%(1)=19
  :A%(2)=0
  :B%(0)=10
  :B%(1)=14
  :B%(2)=18
  :D%(0)=1
  :D%(1)=-1
  :D%(2)=1
  :COLOUR 1
  :FOR I%=0TO BA%
  :F%(I%)=0
  :Q%(I%)=32
  :R%(I%)=32
  :E%(I%)=0
  :PRINT TAB(A%(I%)
  ,B%(I%));CHR$ 224
  :NEXT
15 B%=0
  :G%=8
  :O%=32
  :J%=0
  :X%=6
  :Y%=30
  :C%=227
  :COLOUR 7
  :PRINT TAB(X%,Y%)
  CHR$ 227
  :PRINT TAB(0,29);
  STRING$(LIV%-1,
  CHR$ 229+" ")
16 VDU 23,1;0;0;0
17 IF J%=1
  THEN 51
18 H%=0
  :V%=0
  :IF INKEY (-98)
  THEN H%=-1
  :V%=0
19 IF INKEY (-67)
  THEN H%=1
  :V%=0
20 IF INKEY (-105)
  THEN V%=1
  :H%=0
21 IF INKEY (-73)
  THEN V%=-1
  :H%=0
22 IF INKEY (-99)
  THEN GOSUB 49
23 IF X%+H%<0OR X%+H%>19
  THEN H%=0
24 IF X%+H%=4AND Y%=30
  THEN H%=0
25 IF POINT(X%*64+24
  ,(32-Y%)*32-16)<7
  THEN 44
26 IF H%=0AND V%=0
  THEN 33
27 R%=32
  :PO%=POINT((X%+H%)*64+8
  ,(32-Y%-V%)*32-4)
  :IF V%<>0AND PO%<>6
  AND O%=225
  THEN V%=0
  :R%=225
  :T%=6
  ELSE IF V%<>0AND PO%<>6
  THEN V%=0
  ELSE IF V%<>0AND PO%=6
  THEN R%=225
  :T%=6
28 IF PO%=6
  THEN R%=225
  :T%=6
29 IF PO%=4
  THEN 40
30 IF POINT((X%+H%)*64+8
  ,(32-Y%)*32-36)<>3
  AND POINT((X%+H%)*64+8
  ,(32-Y%)*32-36)<>6
  THEN 63
31 X%=X%+H%
  :Y%=Y%+V%
  :COLOUR Q%
  :C%=C%+1
  :IF C%=229
  THEN C%=227
32 PRINT TAB(X%-H%,Y%-V%);
  CHR$ O%;
  :COLOUR 7
  :PRINT TAB(X%,Y%);
  CHR$ C%;
  :O%=R%
  :Q%=T%
33 IF B%>0
  THEN B%=B%-10
  :COLOUR 3
  :PRINT TAB(11,4);B%;
  "  "
  :IF B%<1
  THEN 63
34 FOR I%=0TO BA%
  :IF E%(I%)=1AND
  POINT(A%(I%)*64+8
  ,(32-B%(I%))*32-36)=3
  THEN SOUND 0,1,5,1
  :E%(I%)=0
  :D%(I%)=-F%(I%)
  :F%(I%)=0
  ELSE IF E%(I%)=1
  THEN 38
35 IF POINT(A%(I%)*64+8
  ,(32-B%(I%))*32-36)=0
  THEN E%(I%)=1
  :F%(I%)=D%(I%)
  :D%(I%)=0
36 IF A%(I%)=5AND B%(I%)=3
  0OR A%(I%)=19AND B%(I%)
  =30
  THEN PRINT TAB(A%(I%)
  ,30);" ";
```

→

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The Editor, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport.

And please mark your envelope clearly "GAME".

Barrel Battle listing

From Page 123

```
   :GOSUB 72
37 R%(I%)=32
   :IF POINT((A%(I%)+D%(I%
   ))*64+8,(32-B%(I%))*32-
   4)=6
   THEN R%(I%)=225
   :T%(I%)=6
38 COLOUR O%(I%)
   :A%(I%)=A%(I%)+D%(I%)
   :B%(I%)=B%(I%)+E%(I%)
   :PRINT TAB(A%(I%)-D%(I%
   ),B%(I%)-E%(I%));
   CHR$ Q%(I%);
   :COLOUR 1
   :PRINT TAB(A%(I%)
   ,B%(I%))CHR$ 224;
   :O%(I%)=T%(I%)
   :Q%(I%)=R%(I%)
   :NEXT
39 GOTO 17
40 IF G%>0
   THEN 30
41 FOR I%=1TO 10
   :READ N%,D%
   :SOUND 1,1,N%,D%
   :NEXT
   :RESTORE
   :S%=S%+B%
   :L%=L%+1
   :IF L%>4
   THEN L%=4
42 IF L%=4AND W%<>3
   THEN LIV%=LIV%+1
43 CLS
   :GOTO 11
44 SOUND 0,1,6,1
   :COLOUR 7
   :PRINT TAB(X%,Y%);
   " ";TAB(X%,Y%)CHR$ 232
   :VDU 19,0,3,0,0,0
   :FOR I=1TO 50
   :NEXT
   :VDU 20
   :FOR I=1TO 75
   :NEXT
   :VDU 19,0,3,0,0,0
   :FOR I=1TO 150
   :NEXT
   :VDU 20
45 LIV%=LIV%-1
   :IF LIV%=0
   THEN FOR I=1TO 4000
   :NEXT
   :GOTO 10
46 FOR I=1TO 3500
   :NEXT
   :CLS
   :GOTO 11
47 SOUND 2,1,200,1
   :S%=S%+50
   :COLOUR 1
   :PRINT TAB(6,2);S%
   :G%=G%-1
   :IF G%=0
   THEN SOUND 3,3,100
   ,1
   :B%=500
   :COLOUR 3
   :PRINT TAB(5,4);"BONUS
    500"
48 RETURN
49 IF POINT(X%*64+8,(32-Y%
   )*32-36)<>3
   THEN RETURN
50 SOUND 2,4,100,1
   :J%=1
   :M%=H%
   :H%=0
   :N%=-1
   :K%=0
   :RETURN
51 K%=K%+1
   :IF K%=3
   THEN N%=-N%
52 IF K%=2AND POINT((X%+M%
   )*64+32,(32-Y%)*32+16)=
   5
   THEN GOSUB 47
53 R%=32
   :IF POINT((X%+M%)*64+8
   ,(32-Y%-N%)*32-4)=6
   THEN R%=225
   :T%=6
54 IF X%+M%<0OR X%+M%>19
   THEN 63
55 COLOUR Q%
   :X%=X%+M%
   :Y%=Y%+N%
   :PRINT TAB(X%-M%,Y%-N%)
   ;CHR$ O%;
   :COLOUR 7
   :PRINT TAB(X%,Y%)
   CHR$ 229;
   :O%=R%
   :Q%=T%
   :IF K%=4
   THEN 58
56 IF POINT(X%*64+24
   ,(32-Y%)*32-68)=1
   THEN SOUND 1,1,150
   ,1
   :S%=S%+20
   :COLOUR 1
   :PRINT TAB(6,2);S%
57 GOTO 33
58 J%=0
   :IF POINT(X%*64+8
   ,(32-Y%)*32-36)=0
   THEN 63
59 GOTO 33
60 DEF PROCladder(x%
   ,y%)
61 COLOUR 6
   :FOR I%=y%TO y%+4
   :PRINT TAB(x%,I%)
   CHR$ 225
   :NEXT
62 ENDPROC
63 COLOUR Q%
   :PRINT TAB(X%,Y%);
   CHR$ O%;
   :X%=X%+H%
   :COLOUR 7
   :IF POINT(64*X%+8
   ,(32-Y%)*32-36)=3
   THEN 44
64 REPEAT
   :Y%=Y%+1
   :PRINT TAB(X%,Y%-1);
   " ";TAB(X%,Y%)CHR$ 233;
   :FOR I=1TO 100
   :NEXT
   :UNTIL POINT(64*X%+8
   ,(32-Y%)*32-36)=3
   :GOTO 44
65 COLOUR 129
   :PRINT TAB(0,7);
   STRING$(19,CHR$ 226);
   TAB(5,11);STRING$(12
   ,CHR$ 226);TAB(10
   ,15);STRING$(10,
   CHR$ 226);TAB(0,19);
   STRING$(18,CHR$ 226);
   TAB(4,23);STRING$(16
   ,CHR$ 226);TAB(0,27);
   STRING$(17,CHR$ 226)
66 COLOUR 128
   :PRINT TAB(9,7);" "
   :COLOUR 5
   :PRINT TAB(15,28)
   CHR$ 230;TAB(4,20)
   CHR$ 230;TAB(5,8)
   CHR$ 230;TAB(12,24)
   CHR$ 230;TAB(10,20)
   CHR$ 230;TAB(17,16)
   CHR$ 230;TAB(13,12)
   CHR$ 230;TAB(11,8)
   CHR$ 230
   :COLOUR 4
   :PRINT TAB(18,6)
   CHR$ 231
67 PROCladder(10,26)
   :PROCladder(6,22)
   :PROCladder(14,22)
   :PROCladder(16,18)
   :PROCladder(11,14)
   :PROCladder(15,10)
   :PROCladder(7,6)
   :C%=1
   :RETURN
68 COLOUR 130
   :PRINT TAB(0,7);
   STRING$(19,CHR$ 226);
   TAB(2,11);STRING$(15
   ,CHR$ 226);TAB(7,15);
   STRING$(13,CHR$ 226);
   TAB(0,19);STRING$(19
   ,CHR$ 226);TAB(7,23);
   STRING$(13,CHR$ 226);
   TAB(3,27);STRING$(17
   ,CHR$ 226)
69 COLOUR 128
   :PRINT TAB(10,27);
   " ";TAB(10,19);"  ";
   TAB(9,11);" ";TAB(12
   ,11);" ";TAB(16,15);
   " ";TAB(11,7);"  ";
   TAB(17,23);" ";
   TAB(18,27);" "
70 COLOUR 5
   :PRINT TAB(16,28)
   CHR$ 230;TAB(12,24)
   CHR$ 230;TAB(13,20)
   CHR$ 230;TAB(17,16)
   CHR$ 230;TAB(10,12)
   CHR$ 230;TAB(4,8)
   CHR$ 230;TAB(19,24)
   CHR$ 230;TAB(16,8)
   CHR$ 230
   :COLOUR 4
   :PRINT TAB(18,6)
   CHR$ 231
71 PROCladder(6,6)
   :PROCladder(14,10)
   :PROCladder(8,14)
   :PROCladder(15,18)
```

→

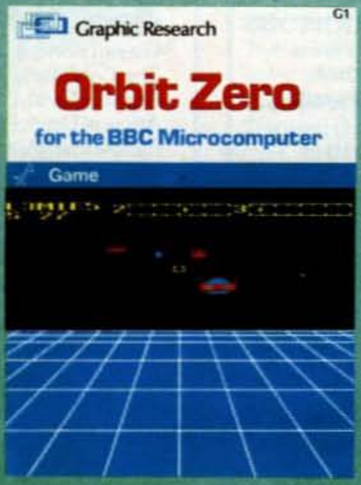
Barrel Battle listing

From Page 125

```
   :PROCladder(8,22)
   :PROCladder(14,26)
   :C%=2
   :RETURN
72 A%(I%)=RND(2)
   :IF A%(I%)=1
   THEN A%(I%)=0
   ELSE IF A%(I%)=2
   THEN A%(I%)=19
73 E%(I%)=0
   :Q%(I%)=32
   :IF A%(I%)=0
   THEN D%(I%)=1
   :B%(I%)=RND(2)
   :IF B%(I%)=1
   THEN B%(I%)=6
   ELSE IF B%(I%)=2
   THEN B%(I%)=18
74 IF A%(I%)=19
   THEN D%(I%)=-1
   :B%(I%)=14
75 RETURN
76 COLOUR 132
   :PRINT TAB(0,7);
   STRING$(18,CHR$ 226);
   TAB(3,11);STRING$(17
   ,CHR$ 226);TAB(0,15);
   STRING$(20,CHR$ 226);
   TAB(0,19);STRING$(17
   ,CHR$ 226);TAB(0,23);
   STRING$(19,CHR$ 226);
   TAB(1,27);STRING$(19
   ,CHR$ 226)
77 COLOUR 128
   :PRINT TAB(7,7);" ";
   TAB(10,7);"  ";
   TAB(14,7);" ";TAB(11
   ,11);"   ";TAB(5,15);
   " ";TAB(8,15);"  ";
   TAB(3,19);" ";TAB(12
   ,19);"  ";TAB(1,23);
   " ";TAB(9,23);"  ";
   TAB(6,27);" ";TAB(12
   ,27);"  "
78 PRINT TAB(17,27);"
    "
   :COLOUR 5
   :PRINT TAB(9,8)
   CHR$ 230;TAB(6,12)
   CHR$ 230;TAB(18,12)
   CHR$ 230;TAB(11,16)
   CHR$ 230;TAB(16,16)
   CHR$ 230;TAB(2,20)
   CHR$ 230;TAB(7,24)
   CHR$ 230;TAB(18,24)
   CHR$ 230
   :COLOUR 4
   :PRINT TAB(17,6)
   CHR$ 231
79 PROCladder(4,6)
   :PROCladder(16,10)
   :PROCladder(1,14)
   :PROCladder(15,18)
   :PROCladder(4,22)
   :PROCladder(8,26)
   :C%=4
   :RETURN
80 COLOUR 133
   :PRINT TAB(0,7);
   STRING$(18,CHR$ 226);
   TAB(2,11);STRING$(18
   ,CHR$ 226);TAB(0,15);
   STRING$(20,CHR$ 226);
   TAB(0,19);STRING$(19
   ,CHR$ 226);TAB(0,23);
   STRING$(20,CHR$ 226);
   TAB(0,27);STRING$(20
   ,CHR$ 226)
81 COLOUR 128
   :PRINT TAB(4,7);" ";
   TAB(8,7);"  ";
   TAB(13,7);"  ";
   TAB(10,11);" ";
   TAB(13,11);"  ";
   TAB(7,15);"  ";
   TAB(12,15);"  ";
   TAB(2,19);" ";TAB(9
   ,19);"  ";TAB(12,19);
   "  ";TAB(1,23);" "
82 PRINT TAB(9,23);"
    ";TAB(13,23);"  ";
   TAB(6,27);"  ";
   TAB(11,27);"  ";
   TAB(17,27);" "
   :COLOUR 5
   :PRINT TAB(3,8)
   CHR$ 230;TAB(6,12)
   CHR$ 230;TAB(19,12)
   CHR$ 230;TAB(1,16)
   CHR$ 230;TAB(0,20)
   CHR$ 230;TAB(12,20)
   CHR$ 230;TAB(2,24)
   CHR$ 230;TAB(19,24)
   CHR$ 230
83 COLOUR 4
   :PRINT TAB(17,6)
   CHR$ 231
   :PROCladder(6,6)
   :PROCladder(17,10)
   :PROCladder(5,14)
   :PROCladder(16,18)
   :PROCladder(3,22)
   :PROCladder(15,26)
   :C%=5
   :RETURN
84 MODE 7
85 IF S%>TP%
   THEN TP%=S%
86 PRINT TAB(12,0)
   CHR$ 141;CHR$ 129;
   "BARREL BATTLE"
   :PRINT TAB(12,1);
   CHR$ 141;CHR$ 129;
   "BARREL BATTLE"
87 PRINT 'CHR$ 130" You
    must collect all the
    teapots then"
   :PRINT CHR$ 130"ring
    your friends for a
    cup of tea"
   :PRINT CHR$ 130"before
    your bonus reches
    zero. You get"
   :PRINT CHR$ 130"50
    points per teapot
    plus 20 points"
   :PRINT CHR$ 130"per
    barrel jumped well.
    Move"
88 PRINT CHR$ 130"using
    'Z' and 'X' for left
    and right,"
   :PRINT CHR$ 130"':'
    and '/' for up and
    down. You jump"
   :PRINT CHR$ 130"using
    'SPACE'. You get an
    extra life"
   :PRINT CHR$ 130"after
    sheet three."
   :PRINT 'CHR$ 129"Press
    'C' to change start
    sheet,"
89 PRINT CHR$ 129"press
    'S' to turn sound
    on or off,"
   :PRINT CHR$ 129"press
    'B' for the number
    of barrels,"
   :PRINT CHR$ 129"press
    'R' to reset all data.
   "
   :PRINT 'CHR$ 133"YOUR
    SCORE = ";S%
   :PRINT CHR$ 133"HIGH
    SCORE = ";TP%
   :PRINT 'CHR$ 131"Press
    'SPACE' to begin."
90 *FX15
91 Q$=INKEY$ (0)
   :IF Q$=" "
   THEN RETURN
92 IF Q$="S"
   THEN GOSUB 100
93 IF Q$="C"
   THEN GOSUB 105
94 IF Q$="B"
   THEN GOSUB 97
95 IF Q$="R"
   THEN BA%=2
   :L%=1
   :*FX210,0
96 GOTO 91
97 PRINT TAB(0,23);"How
    many barrels ? (1
    to 3)";
98 Q%=INKEY (0)
   :Q%=Q%-48
   :IF Q%<1OR Q%>3
   THEN 98
99 BA%=Q%-1
   :PRINT TAB(0,23);
   SPC (27)
   :RETURN
100 PRINT TAB(0,23);"Sound
     on ? (Y/N)";
101 Q$=INKEY$ (0)
    :IF Q$="Y"
    THEN *FX210,0
102 IF Q$="N"
    THEN *FX210,1
103 IF Q$=""
    THEN 101
104 PRINT TAB(0,23);
    SPC (16);
    :RETURN
105 PRINT TAB(0,23);"Which
     level ? (1 to 4)";
106 Q%=INKEY (0)
    :Q%=Q%-48
    :IF Q%<1OR Q%>4
    THEN 106
107 L%=Q%
    :W%=Q%
    :PRINT TAB(0,23);
    SPC (22);
    :RETURN
```

This listing is included in this month's cassette tape offer. See order form on Page 97.

Try us for quality software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Game

For the BBC Microcomputer

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Please mention this magazine by name when ordering

BBC MICRO USER
Deathwatch
and 24 other programs listed in the pages of BBC Micro User Vol. 1, No. 1.

March Issue
DEATHWATCH, a superb arcade game **BINGO**, clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** function keys in machine code. 0.1 **COLOUR** and **GRAPHICS ROUTINES**: create a kaleidoscope of screen designs.

BBC MICRO USER
KING KONG
and 22 other programs listed in the pages of BBC Micro User Vol. 1, No. 2.

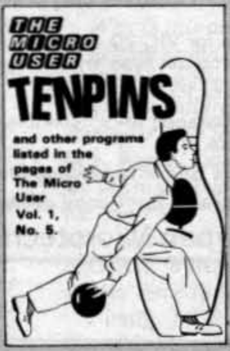
April Issue
KING KONG, rescue girls from the Empire State Building before killing Kong. **NIM**, a structural game of strategy. **TOKENS**, unravel the Basic ROM; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler.

BBC MICRO USER
AIR STRIKE!
32k
and 33 other programs listed in the pages of BBC Micro User Vol. 1, No. 3

May Issue
AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM; ANAGRAMS**, the word game. **CHARACTER**, generate vertical and inverted text. **TELETEXT**, animation in Mode 7. **BEEB**, two joystick exercises.

THE MICRO USER
SPACE PILOT
and other programs listed in the pages of BBC Micro User Vol. 1, No. 4.

June Issue
SPACE PILOT, lost in space you must fight off repeated attacks from alien life forms. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **COLOURFUL CHARACTERS PLUS** other listings from the June issue.


THE MICRO USER
TENPINS
and other programs listed in the pages of The Micro User Vol. 1, No. 5.

July Issue
TENPIN, a simulation of Tenpin Bowling; **SPACEPODS**, beat the alien hordes; **CUP**, Exciting 3D graphics techniques **TEST** and **STEADY**, programs to accompany the Beeb Body Building Course. **BREAKFIX**, Don't let Break destroy your precious variables!

THE MICRO USER
FRUITIES
and other programs listed in the pages of The Micro User Vol. 1, No. 6

August Issue
FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **ANIMATION**, a suite of programs that really bring your screen alive; **CASDISC**, the machine code downloader for your disc system; **MODE 7** colour routines.

AT LAST!

You can now get Micro User programs on disc.

Since we started our highly successful cassette service to readers we have been inundated with requests to supply each month's programs on disc.

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And all for £6.75 a disc, including post and packing.

Of course, our very popular cassette tapes of the month's programs are still available. The price for these is unchanged – £3.75 a cassette, including post and packing.

ORDER FORM ON PAGE 97

THE MICRO USER
Robin and Marian
and other programs listed in the pages of The Micro User Vol. 1, No. 7

September Issue
ROBIN & MARIAN, rescue Maid Marian from the Sheriff of Nottingham. **GALACTIC INVADERS**, an exciting arcade game. **DFS BENCHMARKS**, 14 DFS test programs. **ANIMATION**, new techniques. **TERMINAL**, connect a BBC Micro to a mainframe.

THE MICRO USER
GONE FISHIN'
and other programs listed in the pages of The Micro User Vol. 1, No. 8

October Issue
FISHING, a compulsive day's angling. **JOYKEY**, convert programs to joystick. **PENTEST** and **BELLRINGER**, for Micro User light pens. **CONTOURS**, an educational program. **LINK** BBC Micros to each other. **PLUS** all the listings from the first Electron User.

THE MICRO USER
Goblins and Blackjack
and other programs listed in the pages of The Micro User Vol. 1, No. 9

November Issue
GOBLINS, an enchanted journey. **BLACKJACK**, the casino favourite. **CHARGE** and **PENDULUM**, Body Building Course part 9. **SIDEWAYS**: programs in ROMs. **PENDRAW**, a light pen sketching program. **PLUS** all the programs from the second Electron User.

THE MICRO USER
Tower Bridge
and other programs listed in the pages of the Micro User Vol. 1, No. 10

December Issue
TOWER, rescue London's treasure **SANTA**, help Father Christmas deliver his presents. **VDU 23**, an invaluable character defining utility. **PAGED**, the listing from our paged graphics article. **PLUS** all the listings from the third issue of Electron User.

THE MICRO USER
Barrel Battle
and other programs listed in the pages of the Micro User Vol. 1, No. 11

January Issue
BARRELS, an all-action arcade game. **NOTEPLAY**, an entertaining musical utility. **DUMP1** and **DUMP2**, multitone screen dumps. All the programs from our **SOUND, BEGINNERS'** and **GRAPHICS** articles **PLUS** 12 programs from the fourth Electron User.

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MICROMAIL

Tape-to-disc copying problems

HOW much software have you bought on cassette that is deliberately written to tape in such a way as to make transfer to disc difficult, if not impossible?

A determined software thief only needs two cassette recorders to copy a tape, and there are plenty of two-cassette music centres around to make this very easy.

It seems only fair to me that if a cassette version is protected from "backup" (illegal copying) then the manufacturer should give you the option of swopping the cassette for a disc plus a cash payment, if and when you move to a disc filing system.

A number of software houses do allow this but the majority do not.

In Britain ridiculous record prices move people to illegally tape music.

In the same way, most software firms are cutting their own throats, and at the same time allowing yet other software firms and sometimes even themselves to line their own pockets by producing tape-to-disc copying aids.

Of course the fact that nearly all the big record companies are moving into software has nothing to do with this problem at all. – **Neil Palmer, Bath.**

● It would be interesting to have comments on this subject from readers and software houses. Certainly, it seems to cause a lot of customer relations problems.

BREAKing BAD habits

WE have a BBC Model B in our school fitted with a disc interface.

At present due to lack of funds we load from tapes. One of the programs supplied by MEP loads satisfactorily and runs, but if you press BREAK it cannot be retrieved using OLD and RUN commands.

All we get is "Bad program".

If however we load, then LIST the program, things are different.

While the listing is on screen, pressing BREAK then OLD and RUN commands does not lose the program.

Why is this and is there a way of getting round the problem? Or do I remove the BREAK button when the children are using the computer, as I feel tempted to? – **M.J. Barrie, London SW16.**

● There are two possible causes for the "loss" of the program, and short of removing the BREAK button, there is no simple remedy for either.

Firstly, MEP could be doing something to cause BREAK to destroy the program (for example, an FX call).

Secondly, the program could download itself to &E00, so pressing BREAK corrupts several bytes if a DFS is present.

IF you're a Prestell subscriber you can now write to Micromail by Electronic Mail. Our Mailbox number is 614568383.

Adelaide network

BEEBNET is a user's group based in Adelaide but servicing users throughout South Australia and in other states.

A fair proportion of teacher-users is involved, hence the "net" for Econet or network in the title, but it is by no means exclusively a teacher based group.

Schools include private, public (state), primary, secondary, and tertiary plus various tech studies bodies and computing centres.

Plus, of course, several trade representatives including Jim Reed of Northgate Computing.

In July we were 64 strong and growing – to quote our monthly newsletter.

We meet once a month and have either guest speakers or fellow members address us on prearranged topics. For example, last month was on the use of View.

Hope this is of some interest to you (if somewhat slow in coming!) – **Ron Co, Moonta, South Australia.**

Unhappy eproms

IT may not be well known that certain makes of 2764 eprom do not like the BBC Micro in which to live.

My recent experience with a Mitsubishi 2764 for use in the sideways ROM sockets required a little work with the soldering iron within the bowels of my series 3 board.

Although the pin layout of the 2764 shows no connection on pin 1, this is not strictly true.

The fact is that you may well get away with it with certain makes of eprom, while others refuse to work after a while.

The answer is very simple, although only for the brave.

What is required is the fitting of a suitable pull-up resistor soldered from pin 1 to the +5v rail, and this is easiest done by removing the board and fitting it across from pin 1 to pin 28.

I have it on good authority that Acorn are aware of this problem and may well have modified the later boards.

I have used a value of 18k which seems to work OK. The whole operation takes about 20 minutes. – **S.J. Gilbert, Manchester.**

MACE system

REGARDING Mr Taurin's letter (Micromail, October 1983) concerning the use of 380Z disc drives in a network of BBC Micros, MACE (Microelectronics and Computers in Education) have a network which will allow up to seven BBC Micros to use a 380Z as a file server and as a printer.

I have used this sytem for some time and find it an excellent one and quite reasonably priced.

Apart from this single, and may I say uncharacteristic, error, I have found your magazine to be the best on the market.

Indeed the articles on Body Building are especially useful and other periodicals are particularly weak in this area. – **J.A.McBride, Deramore School, Belfast.**

Enigmatic code

I AM interested in writing machine code programs, but I haven't the faintest idea about it. Is assembly language machine code?

Also, I have tried various ways of entering binary code, but

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none of them seems to work.

In one of your issues, it displayed binary by placing a % sign in front of the code, for example %11100101.

When I tried entering this, it said something like, "No such variable", and when I typed the same back to it, it then said, "Syntax error".

Now on to my Beeb's baby brother, the Electron. From all the reviews I have read, it sounds as good as the Beeb apart from the graphics speed, so am I paying £200 more for graphics speed? – **A. Jones, Keighley, Yorks.**

● Last point first. For your extra £200, not only do you get more speed, but the user port, RS423, A/D converter, Centronics interface, Mode 7, etc.

Assembly language is an easy-to-use computer language, that the assembler translates into machine code, which is a sequence of numbers.

You cannot enter binary directly into a BBC Micro – the "%" sign is just to show we humans that we're dealing with binary. The computer does not recognise it.

Sparkjet graphics

I ENCLOSE a copy of the listing of a program to dump Mode 0 or Mode 1 graphics on the BBC Model B to the Olivetti JP1 "Sparkjet" printer.

The program accesses the memory locations directly and is consequently quite fast – certainly much quicker than if the POINT function in Basic is used to inspect individual pixels.

On another subject entirely, I would like to say how much I enjoy reading The Micro User, and particularly the recent discussions on the benefits or otherwise of writing structured programs.

Having had experience of several different micros before coming to the BBC, it has really made me appreciate the machine to be able to write and use procedures again, just like using Algol on large mainframes at university.

Structured programming is not an intellectual game – it is an essential discipline for any programmer who wishes to graduate from the limited arena of micros to bigger and better things.

There has been much criticism of the teaching of computing in schools by those in higher education in recent years, often because sixth formers come to a college or university full of bad habits picked up on micros, and indiscriminate use of GOTO is one of the worst.

It is my opinion that the BBC dialect of Basic will become increasingly more widely used as the benefits of its structure in curbing the wild enthusiasm of GOTO and GOSUB users are more generally recognised.

Having said all that, I apologise for the two GOTOs in my program – bad habits die slowly! – **John Fryett, Head of Mathematics, Yehudi Menuhin School, Cobham, Surrey.**

Mode markers

YOUR reader D.L. Harper (Micromail, November 1983) says that by looking at memory location &367 you can find out which screen mode you are in.

On my machine (OS 1.20) this location contains the value 15 for all modes. But location &355 does contain a value 0 to 7 which corresponds to the current screen mode.

Why the discrepancy, and is this normal? – **G.A. Rooker, London.**

● As mentioned in the letter, the location given were for OS 0.1. The location containing the screen mode is indeed &355 in OS 1.2.

Look, no mods!

I REFER to your September 1983 issue and the article about the Watford DFS.

I recently installed the Watford DFS and note that the instructions I received and your article refer to modifying the circuit board particularly with an issue 3 BBC Micro.

I have the issue 3 but had a couple of months ago inserted the OS 1.2.

On inserting all the chips for the Watford DFS I found that the whole Micro runs without making any modification, cutting of wires, pins etc. Everything works without any problems whatsoever.

Am I right in assuming that the new OS 1.2 removes the necessity to modify the circuit board on issues 3 and older? – **R.H. Langdon, Houghton le Spring, Tyne and Wear.**

● The answer to this one, we are reliably informed, is that some boards which were screen printed "Issue 3" were in fact Issue 4.

Pressing problem

I HAVE a Model B machine, operating on OS 1.2.

One of my applications requires the use of a cassette tape to hold up to 100 separate files, any of which requires to be updated, without affecting the remaining files.

Clearly, fairly accurate tape positioning is necessary, and the recorder's tape counter would not be reliable enough. My recorder has motor control.

The need is therefore for the computer to be able to control the positioning of the tape. This is straightforward enough by using the MOTOR commands, except in one vital case.

The exception relates to the OPENOUT command. The OS

```
 10 REM MODE 0 Graphics
     on printer (for black
     background)
 15 m%=?&355
    :REM graphics mode

 20 VDU 2
    :IF M%>0THENVDU1,27
    :VDU 1,47
    :RESTORE 80
 30 VDU 1,27
    :READ I$
    :L=LEN I$
    :FOR I%=1TO L%
    :Z%=ASC (MID$(I$,I%
    ,1))
    :VDU 1,Z%
    :NEXT
    :VDU 1,27
    :VDU 1,90
    :IF M%>0
    THEN 70
 40 DATA "G100;80;33;4"
 50 FOR I%=&3000TO &7FFF
    STEP 640
    :FOR C%=0TO 7
    :FOR J%=I%+C%TO I%+C%+6
    39STEP 8
    :VDU 1,?J%
    :NEXT
    :NEXT
    :NEXT
 60 GOTO 120
 70 REM MODE 1 Graphics
     on printer (for black
     background)
 80 DATA "G100;40;33"
 90 FOR I%=&3000TO &7FFF
    STEP 640
    :FOR C%=0TO 7
    :FOR J%=I%+C%TO I%+C%+6
    39STEP 16
100 P%=FNS(J%)*16+FNS(J%+8)
110 VDU 1,P%
    :NEXT
    :NEXT
    :NEXT
120 VDU 1,&1B,1,&30,3
    ,7
    :END
130 DEF FNS(Q%)=(?Q%
    DIV &10) OR (?Q%
    AND &F)
```

Reader John Fryett's program to dump BBC graphics to the Olivetti JPI sparkjet printer

● ***Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

displays the message RECORD then RETURN, and while it waits for the operator to RETURN (a variable and uncontrollable amount of time), the tape remains in motion, and may have information written to it in the wrong place.

In this case, the computer does not have control of the tape's position.

Can you suggest a way to overcome this problem? It seems that I may have to abandon OPENOUT, and reproduce in assembler, a variant of the command; (if so, what exactly does OPENOUT do?).

A second problem again relates to OPENOUT. When I am writing all 100 files, one after another, which happens in one instance in my program, I have to sit at the computer, pressing RETURN, once for each of the 100 files, whenever the RECORD then RETURN message appears.

In all cases, except for the first file, the OS message is strictly wrong, because RECORD is already pressed down.

In theory, there should be no need to have to keep pressing RETURN. Is assembler the only answer here? – **David Pentecost, Leighton Buzzard, Beds.**

● We're stuck by this one. Can anybody help us?

Hong Kong phooey

I HAVE just read in your August edition a rather curt letter from Colin Malone of BBC Enterprises which stated with reference to BBC Micros that "machines manufactured in Hong Kong will not be sold in the UK".

The letter went on to instruct you to correct "any misunderstanding which could well have occurred, at the earliest opportunity".

It may interest you (and him!) to learn that on August 12 I purchased from my local Acorn dealer a BBC model B which is clearly labelled "assembled in Hong Kong".

Who's kidding whom? And why? – **D.R. Stafford, Camberley, Surrey.**

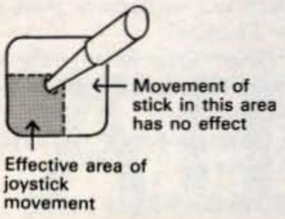
Restricted joy

I AM writing to seek advice from you further to your article in the May 1983 issue of BBC Micro User on constructing a joystick controller.

Although a BBC Micro owner and enthusiast I am a novice at electronic construction. However, I felt your article made the task seem straightforward enough even for me to attempt.

I accordingly bought what seemed to be the requisite parts by mail order. I used a two axis joystick control fitted with two 220k lineas potentiometers.

I find that I can only effectively use one quarter of the joystick's area of movement.


Movement of stick in this area has no effect
Effective area of joystick movement

This seems to be because ADVAL(1) and ADVAL(2) return the value 65520 when the arm of the joystick has travelled only half of its full movement. – **Alan Thomas, London.**

● The wire you have connected to PIN 1 of the analogue port should be connected to Vref (Pin 11) instead, for your type of joystick. I think this applies to the Tandy joystick as well.

Mike Cook

Drifters

WE own a BBC 'B' and use with it a Sony portable colour TV.

Our problem is that when we have graphics on the screen, particularly large blocks of colour (as on your "Fishing" program) we have lines continually drifting across.

I believe this is to do with the modulator, but have been unable to discover a cure. – **T. Barnett, Southampton.**

● By altering the trimmer capacitor near the colour burst crystal, you can slow down and eventually stop the drifting colours.

More adventure

I MUST firstly praise the high standard of your excellent magazine, in my opinion it is THE magazine for the BBC user.

Secondly, I would like to endorse J. Bibby's (Volume I, No 9) request for an adventure column.

I too, am fed up with buying magazines purporting to have an adventure column, only to find the author has never heard of the BBC Micro.

Please rectify this, the only fault in an otherwise perfect magazine.

Also, about M.B. Holland's problem (Volume I, No 8) of the "Rampart Robot", try <FLEZ>! – **P.B.C. Gardener, Manchester.**

● The adventure reviews in this issue mark the start of a regular column, devoted, of course, to the BBC Micro.

Getting it all together

ONE question has been nagging me ever since I unpacked my model B.

There are many disc drives on the market and I was wondering if they all included DFS, cables etc (especially the Acorn disc) and whether they are all compatible with each other. – **Neil Graham, Doncaster.**

● When you buy a disc drive you always get the cables you require. However, DFS, manual and formatter programs come separately.

There should, however, be absolutely no difficulty in purchasing these together with your disc drives from the same dealer – thus ensuring compatibility.

Line changer

IS it possible to write a program which when run will make up a new line and add it to itself?

In other words, is there a method by which a program can change itself other than by "merging" with another program? – **J.P. Williams, Norwich.**

● This can be done if you understand how the Basic program is stored. Changing lines is very easy. Try this:

```
  10 REM TRIAL PROGRAM
      TO SHOW THAT A PROGRAM
      CAN CHANGE ITSELF
  20 KOUNT = PAGE +4
  30 REPEAT
  40 READ BYTE
      : ?KOUNT = BYTE
      :KOUNT = KOUNT+1
  50 UNTIL BYTE=0
  60 KOUNT=KOUNT-2
  70 REPEAT
  80 KOUNT=KOUNT+1
      :?KOUNT=32
  90 UNTIL ?(KOUNT+1)=&0D
 100 END
1000 DATA 241,34,73,84
      ,32,87,79,82,75,83
      ,34,58,65,61,166,40
      ,49,48,48,48,41,58
      ,241,34,79,75,34,58
      ,224,0
```

Disc link

*IN Micromail Simon Taurins enquired whether a BBC Micro could use the disc drives of a RML 380Z. I can see no difficulty in doing this, provided that the two machines are connected together via their serial ports and that the 380Z has commands equivalent to *FX2,1 and *FX3,1 in the BBC system.*

Storing BBC Micro programs on the 380Z discs will require the BBC Micro to LIST to the RS423 as well as to its own screen and the 380Z will need to be able to load the

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incoming data as a Basic program, and then store it.

If this cannot be done the 380Z will require a machine code utility to load incoming data byte by byte into memory (or straight onto disc).

*Transferring Basic programs from any other micro to the BBC Micro requires only the baud rate (*FX7,n) and word length/parity/stop bits (*FX156,227,n) to be correctly set up and then *FX2,1.*

Following this command the program can then be sent and will be LOADed by the BBC Basic interpreter.

Machine code programs and data will require special utilities to be written for both machines, however.

I have been able to load numerical data into the BBC Micro memory from the disc system of a mainframe computer, and also store BBC Basic programs on the disc. – **R.D. Wright, Leatherhead, Surrey.**

Cut the crackles

I HAVE constructed the circuits for the BBC Micro in your July to September issues for the user port control.

The circuit works, but I am controlling two small 3v DC motors. The motors create flyback over the screen and eventually "crash" the program.

Being new to electronics, could you possibly suggest a way of suppressing the motors? – **Derek Harper, Eastleigh, Hants.**

● Place a 1 microfarad disc ceramic capacitor across the power terminals of your computer, as physically close to the motor as possible.

If that doesn't work, you could, in addition, put an inductor in series with the power lead.

Teletext

CAN you please clarify two points concerning teletext for the BBC Micro/Electron?

If a Teletext TV is used as the computer monitor is there any need for the £225 teletext adapter or is a simpler (cheaper?) device available?

Are there any plans to enable teletext to be used with the Electron? – **M.F. Kelland, Southampton.**

● Unfortunately even if you have a Teletext TV you still need the teletext adapter.

Several people are planning a teletext adapter for the Electron, though when one will appear is a matter of doubt.

Electron programs

ABOUT four weeks ago I bought an Electron. Today I have bought your magazine.

There is one question I couldn't find an answer to. That is, will BBC Micro programs which are on cassette work on my Electron?

Please write back giving me an answer. – **Mark Ivens, age 10, London.**

● Congratulations on buying an Electron.

The answer is that all programs that work on the BBC Micro without using Mode 7 should work.

However, they will be slower and the sounds could well be different.

Also, of course, programs that use joysticks, printers and such like that the Electron hasn't got yet, will fail.

TV signal

I AM now the proud owner of a teletext adapter, but find the signal via the TV aerial needs to be very good. My aerial was in the loft giving me an adequate picture, even being split two ways for two televisions.

However even with a direct feed to the teletext adapter I was unable to get Ceefax on BBC2, Oracle on CH4 and certainly no hope of downloading any programs.

Eventually I had the aerial conventionally mounted on the chimney stack curing all reception and down-loading problems. – **W.D. Lowe, Nantwich, Cheshire.**

And finally, with tongue firmly in cheek . . .

It's a case of over-exposure

Dear Trev,

Have you ever felt a fool? Well if you haven't, come on over and feel me because I am a grade one nit.

It all started when I wrote to Micro User asking why is it I keep on typing in their listings and can't get any of the mistakes all those people keep writing in about. Anyway they published it with a very nice little note from the editor.

So far, so good. It's nice to see your name in print but, sadly, it didn't end there. One of Andrea's little cronies at the bellringers is the wife of a reporter on the Romchester Chronicle.

Of course A. had to mention my little bit of "media exposure" as she insists on calling it.

And, of course, the wife told the husband and he rang me. I don't know who it was suggested that we meet up in the Ram and Buffer, but it was a mistake.

The first part of the evening was quite pleasant. It's nice to be bought drinks and treated like an expert, even if I had to put up with questions like "Have you stopped using your micro to defraud banks and cause World War III?".

Sadly as the evening wore on the drinks began to take effect and I forgot that I wasn't an expert.

I can vividly remember spouting away on all sorts with the reporter scribbling away like mad. If only I could forget! Not that A. will let me.

"In the Eighties, not being able to program is like being illiterate", she keeps repeating with a wicked grin.

For some reason I invited the guy back to my place and let him take photos of me and my micro.

Which explains the picture that appeared next day in the Chronicle under the headline "Computer wizard slams education system".

There I am sitting at my micro grinning inanely at the camera while a syntax error message is displayed on the screen. What I was supposed to have said is so horrible that I won't repeat it.

But A. knows it all, word for word, and she does repeat it. Incessantly.

She's even taken to answering the phone by saying "Computer Wizards Ltd. Do you want to speak to the Chief Warlock?".

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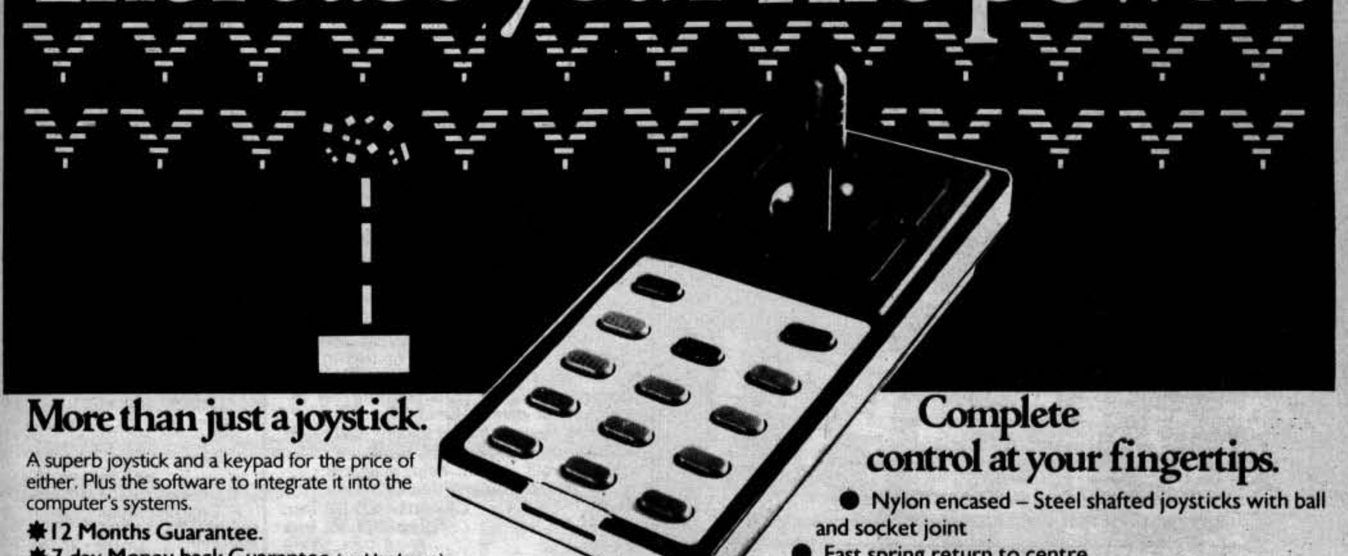

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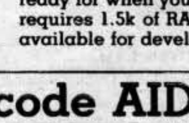

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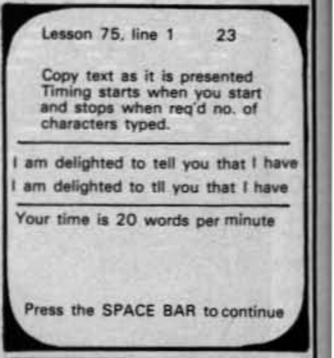

```
Lesson 75, line 1        23

Copy text as it is presented
Timing starts when you start
and stops when req'd no. of
characters typed.

I am delighted to tell you that I have
I am delighted to tll you that I have

Your time is 20 words per minute

Press the SPACE BAR to continue
```

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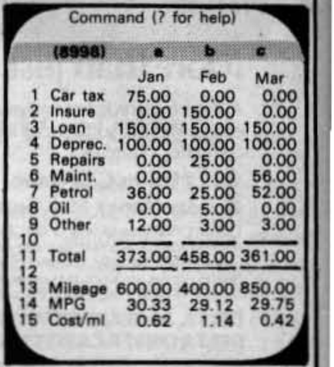

```
          Command (? for help)
   (8998)        a       b       c
                Jan     Feb     Mar
 1 Car tax    75.00    0.00    0.00
 2 Insure      0.00  150.00    0.00
 3 Loan      150.00  150.00  150.00
 4 Deprec.   100.00  100.00  100.00
 5 Repairs     0.00   25.00    0.00
 6 Maint.      0.00    0.00   56.00
 7 Petrol     36.00   25.00   52.00
 8 Oil         0.00    5.00    0.00
 9 Other      12.00    3.00    3.00
10           ------  ------  ------
11 Total     373.00  458.00  361.00
12           ------  ------  ------
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15 Cost/ml     0.62    1.14    0.42
```

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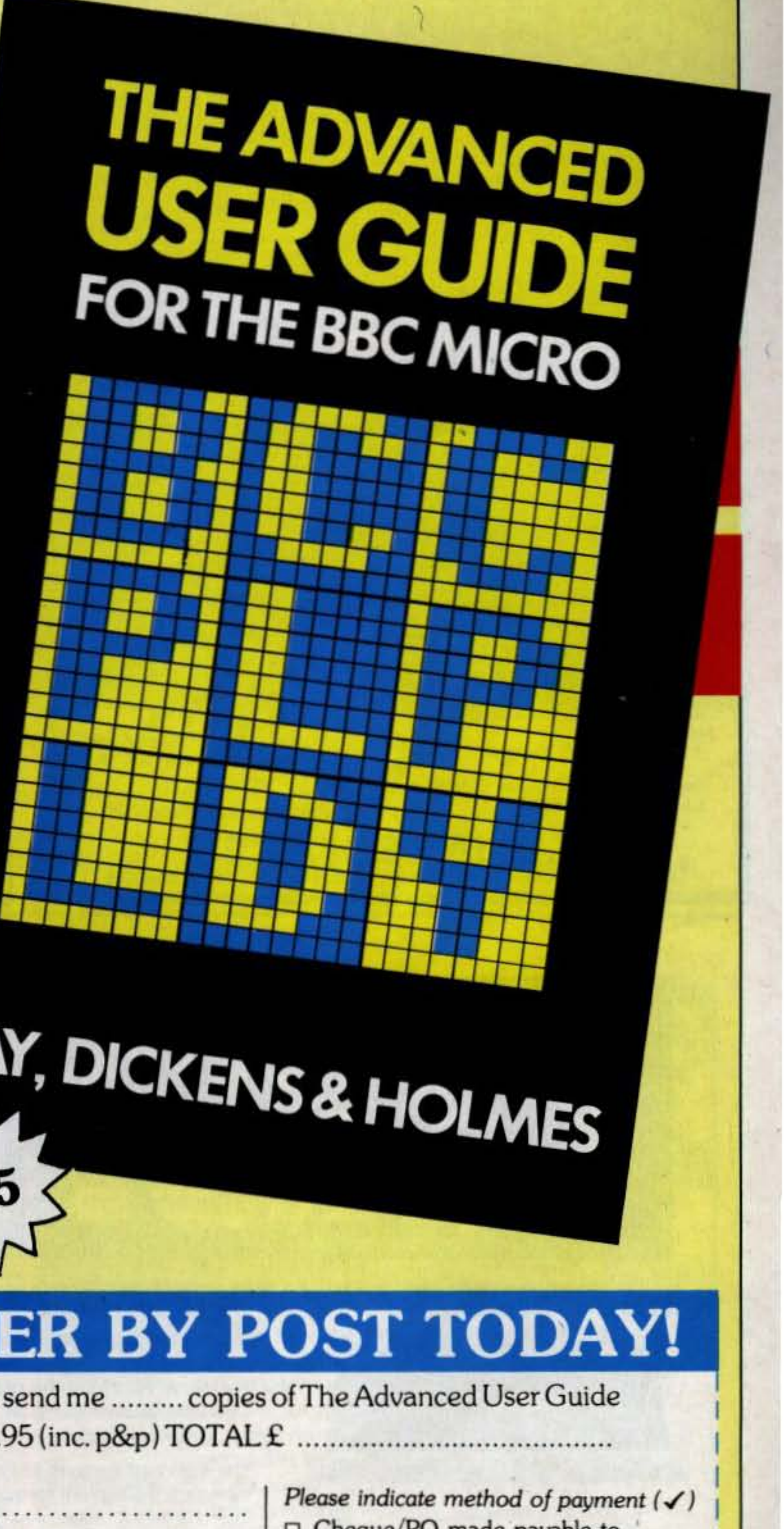
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SERVO CONTROL MODULE
COMMOTION
Futaba
FP-S128

the Beasty with the FP-S128

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What About the Software?

The Beasty is supplied with a demonstration program on tape which allows sophisticated control of up to four servos directly from the keyboard. For those who wish to program the servos, the machine code driver occupies less than 256 bytes of relocatable code (so it can be stored at any location in RAM). From BASIC, instructions are of the form:

```
X% = Channelnum: Y% = Newvalue: CALL Driver
```

From Assembler, it's equally straightforward:

```
LDX 4          ; Servo number 4, for example
LDY NEWVAL%    ; Newval% is the new position
                 (between 0-255)
JSR DRIVER     ; Call Driver routine
```

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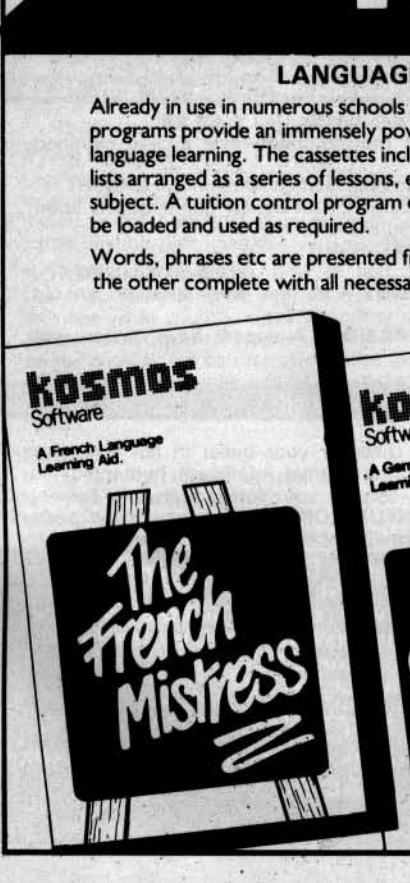

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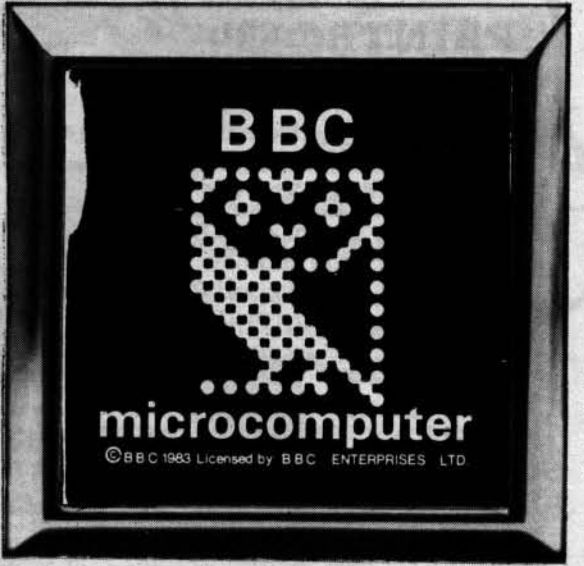

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B) COLOUR BLOCKS bring sizes and colours into perspective.
C) MERRY MUSIC turns the keyboard into a musical keyboard.
D) FUNNY FACES presents a line up, which one is the suspect?
E) FRED THE FROG needs co-ordinated help to get across the pond.
A) THE POND seems very active today.
B) SPEED is required to keep the cake on the conveyor belt.
C) DIRECTIONS seem to be needed by everyone in Orion village.
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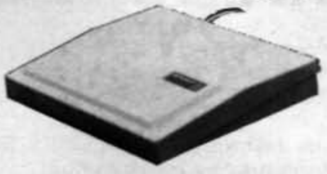

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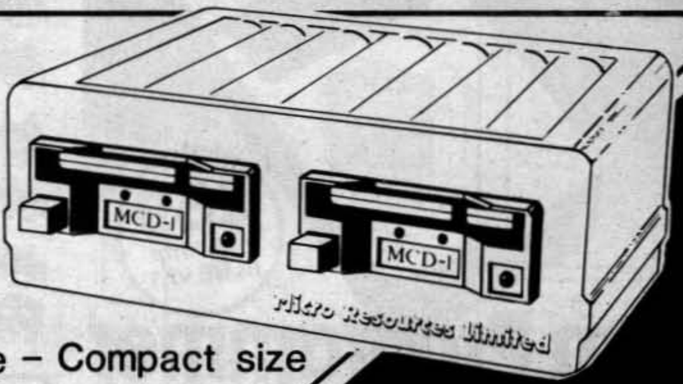

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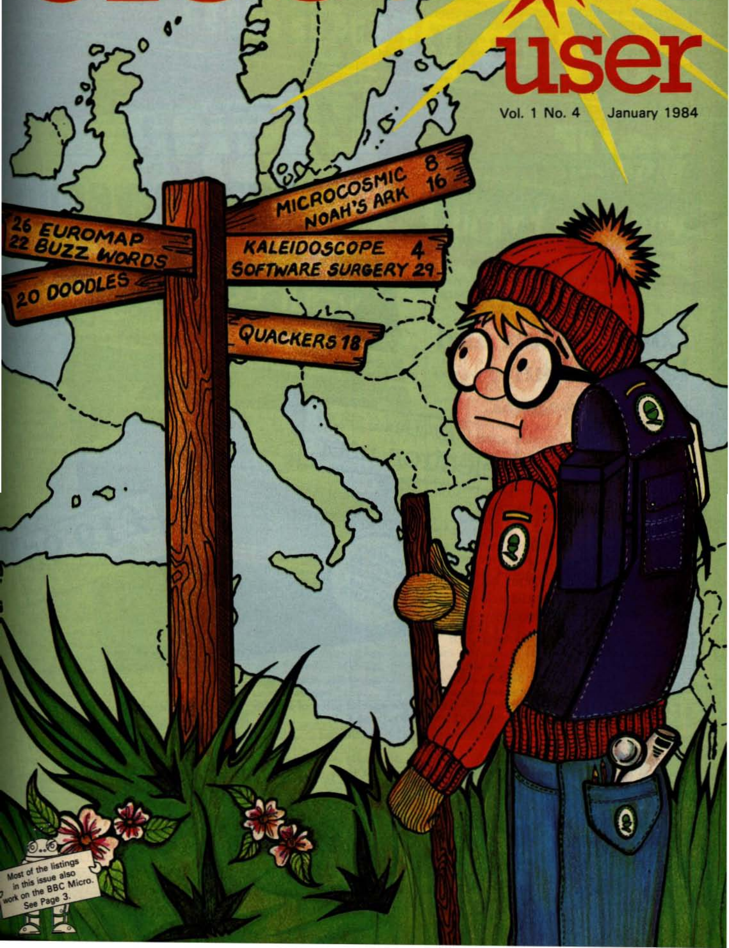
Vol. 1 No. 4 January 1984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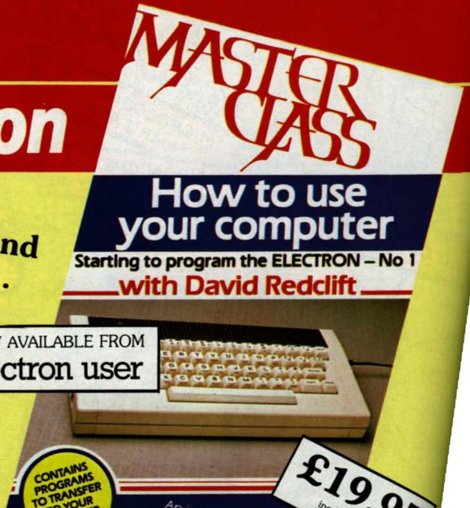
Most of the listings in this issue also work on the BBC Micro. See Page 3.

The easy way to learn how to program your Electron



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It's going to have all the features you've grown to expect – but lots, lots more. We promise you a magazine packed with pages of colourful, exciting listings. Plus frank reviews of all the books, software and hardware now being produced for the Electron.

This first independent issue will see the start of two major series aimed specifically at the beginner – one on Electron Basic, the other on its graphics abilities.

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***Electron User* will be covering all aspects of the micro from how it works to how to get it working. Our experts will be revealing for you the full potential of this amazing machine.**

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To make sure you get the first issue – available in mid-January – place an order with your newsagent NOW.

Or better still, take out a subscription and you'll get your copy every month hot off the press. There's a subscription form on Page 31.

Runaway success for the Electron

ALL over the country demand for the Electron is exceeding supply.

Acorn are being very tight-lipped about the number they are actually producing but it is certainly not enough to satisfy everyone who wants one.

Dealers across the country are desperate for Electrons.

"I can sell every one I can get my hands on", said one.

"I've had one delivery and it nowhere near satisfied my waiting list!

"I haven't even got one for my nephew and my wife's none too pleased about that".

More evidence of the phenomenal interest comes from Leeds.

When the local W.H. Smiths announced that Electrons would be on sale at their new computer shop the result was amazing.

People started queueing the night before – even camping outside the shop. As it was, not everyone was successful.

W.H. Smiths was as forthcoming as Acorn about the numbers of Electrons being produced. However their spokesperson could be drawn about the demand for the micro.

"The Electron is almost embarrassingly successful. It's awful not being able to satisfy everyone who wants one", he said.

Hopefully the situation should improve in the new year when Electrons will be available from three countries – Malysia, Indonesia and Wales.

ALL the programs in this month's *Electron User* should work on a BBC Micro 1.2 OS with Basic II.

Combinations (Pages 6-7) will work with Basic I if you change the semi-colons in the INPUT statements to commas (or even leave them out). However, Microcosmic (Pages 8-9) won't work with Basic I.

Sideways ROM board on show

THE sideways ROM board from SIR computers was recently demonstrated at the offices of *The Micro User*.

The prototype board had room for eight sideways ROMs.

Paul Kathro, the firm's technical director, said: "Eight ROMs were chosen in order to leave room for sockets involved in our later expansions, such as a printer and RS423 ROMs".

Paul disclosed that in his investigations of the ROM system on the Electron he'd discovered that the Basic is actually split between two ROMs.

And the keyboard itself is treated as a sideways ROM.

Unfortunately, the lack of Mode 7 on the Electron restricts the number of BBC Micro ROMs transferable to it.

At present View, Edword and HCCS Forth run successfully on the Electron.

No doubt, with the launch of SIR's board, many companies will be encouraged to adapt or create ROM-based software.

electron user

Electron User welcomes program listings and articles for publication. Listings should be accompanied by cassette tape or disc.

Send to:

Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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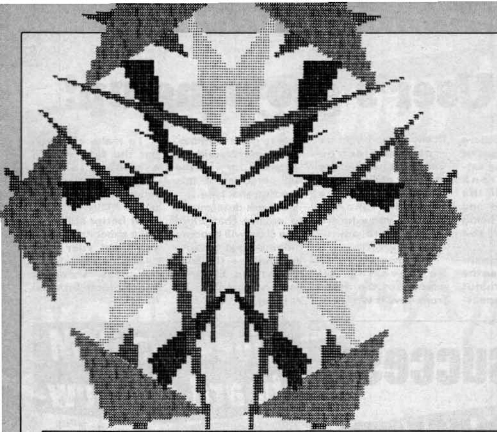
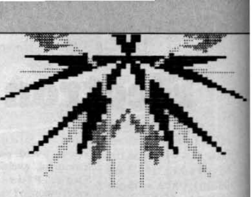
THE MICRO KID
AHA! THE VERY ONE
GAMES
EDUCATIO
UTILITIES
... AND THEY CALL IT SOFT-WARE!!





THE kaleidoscope was invented more than 150 years ago. There are several types which differ slightly in detail.

However, the essential feature of all is a basic random pattern, possibly produced by pieces of brightly coloured glass, which is reflected in mirrors to form symmetrical patterns of considerable aesethic appeal.

Of course, once tired of one pattern, a little shake and there is another!

A common type of kaleido-

```
   10REM KALEIDOSCOPE
   20REM (C) ELECTRON USER
   30MODE1
   40PROCinit
   50PROCpage1
   60PROCpage2
   70MODE 2:VDU5:CLS
   80C%=RND(7):VDU 19,0,C%,0
,0,0
   90FOR L%=1 TO 6
  100PROCcalcs
  110GCOL 0,RND(7)
  120IF S$="A" THEN K%=1:GOT
O 140
  130FOR K%=1 TO 7
  140VDU29,XC%(K%);YC%(K%);
  150PROCtriangles
  160IF S$="A" THEN GOTO 180
  170NEXT K%
  180NEXT L%
  190PROCterm
  200IF G% THEN GOTO 70
  210MODE7
  220END
  230
  240DEF PROCtitle
  250VDU19,1,5;0;19,3,2;0;31
,8,5:COLOUR1
  260PRINT"****  KALEIDOSCOP
E  ****  "
  270VDU 31,8,6:COLOUR3
  280PRINT"****  KALEIDOSCOP
E  ****  "
  290VDU 31,11,9:COLOUR1
  300PRINT"**** PATTERNS ***
*  "
  310VDU 31,11,10:COLOUR3
  320PRINT"**** PATTERNS ***
*  "
  330ENDPROC
  340DEF PROCpage1
  350PROCtitle:COLOUR2
  360PRINT TAB(3,15);"This p
rogram operates in TWO modes
"
  370VDU 31,5,19:COLOUR3
  380PRINT"MODE A....A singl
e large pattern"
  390VDU 31,5,22:COLOUR1
  400PRINT"MODE B....Multipl
e patterns"
  410VDU 31,3,26:COLOUR2
  420PRINT"SELECT the patter
n MODE you require"
  430VDU 31,9,29
  440PRINT"by PRESSING key A
 OR B"
  450*FX21,0
  460S$=GET$
  470IF S$="A" OR S$="B" GOT
O 480 ELSE GOTO 450
  480FOR I%=1 TO 500:NEXT I%
:VDU7
  490ENDPROC
  500DEF PROCpage2
  510CLS
  520PROCtitle:COLOUR2
  530VDU 31,4,14:PRINT"WHEN
EACH PATTERN IS COMPLETE"
  540VDU 31,10,16:PRINT"SELE
CT ONE OF THE FOLLOWING"
  550VDU 31,4,18:COLOUR3:PRI
NT"Press the 'SPACE BAR'"
  560VDU 31,10,19:PRINT"to p
roduce another pattern"
  570VDU 31,4,21:PRINT"Press
 key 'C'"
  580VDU 31,10,22:PRINT"to C
HANGE pattern mode"
  590VDU 31,4,24:PRINT"Press
 key 'T'"
  600VDU 31,10,25:PRINT"to T
ERMINATE program"
  610VDU 31,4,28:COLOUR2:PRI
NT"PRESS THE";:COLOUR1:PRINT
" SPACE BAR";:COLOUR2:PRINT"
 TO"
  620VDU 31,8,30:PRINT"PRODU
CE THE FIRST PATTERN  "
  630F$=GET$:IF F$<>" "THEN
GOTO 630
  640ENDPROC
  650
  660DEF PROCinit
  670DIM X(3,3),Y(3,3),XC%(7
),YC%(7)
  680FOR I%=1 TO 7:READ XC%(
I%),YC%(I%):NEXT
  690DATA 640,514,370,994,91
0,994,1180,514,910,34,370,34
,100,514
  700SCALE1=250:SCALE2=400
  710ENDPROC
  720
  730DEF PROCcalcs
  740IFS$="A" THEN SCALE=SCA
LE2 ELSE SCALE=SCALE1
  750FOR J%=1 TO 3
  760R=SCALE*RND(1):TH=1.047
*(RND(1)+0.5)
  770X(1,J%)=R*COS(TH):Y(1,J
%)=R*SIN(TH)
  780XH=X(1,J%)/2:XV=X(1,J%)
*0.866
  790YH=Y(1,J%)*0.866:YV=Y(1
,J%)/2
  800X(2,J%)=YH+XH:Y(2,J%)=-
YV+XV
  810X(3,J%)=YH-XH:Y(3,J%)=-
YV-XV
  820NEXT
  830ENDPROC
  840
  850DEF PROCtriangles
  860FOR I%=1 TO 3
  870MOVE X(I%,1),Y(I%,1)
  880MOVE X(I%,2),Y(I%,2)
  890PLOT 85,X(I%,3),Y(I%,3)
  900MOVE -X(I%,1),Y(I%,1)
  910MOVE -X(I%,2),Y(I%,2)
  920PLOT 85,-X(I%,3),Y(I%,3
)
  930NEXT
  940ENDPROC
  950
  960DEF PROCterm
  970*FX15,1
  980G%=0:B$=GET$
  990IF B$="T" THEN ENDPROC
 1000IF B$=" " THEN G%=1:END
PROC
 1010IF B$="C" THEN GOTO 102
0 ELSE GOTO     970
 1020IF S$="A" THEN S$="B" E
LSE S$="A"
 1030G%=-1
 1040ENDPROC
```

Create a colourful kaleidoscope

A fascinating and inspiring program by GWEN and ROY COLLIER

scope consisted of three similar mirrors joined at their edges so that the cross-section was an equilaterial triangle.

This program given here simulates the patterns produced by this kind of instrument.

The basic patterns produced within the triangle, together with five reflections, is a hexagonally symmetrical pattern which can be viewed by selecting MODE A from the menu.

MODE B, on the other hand, shows more reflections, giving a field of view which is similar to part of a wallpaper or fabric design.

Naturally, the construction of the basic pattern relies much on the RND number function.

Line 80 replaces the black background with a randomly selected colour, while line 110 selects a colour for each of the basic pattern components, which, for simplicity, are triangles.

The vertices of each triangle are randomly generated in line 760. This produces the polar co-ordinates of a point in the triangle shown in the diagram.

These are then transformed into cartesians in the next line.

The remainder of the PROCcalcs calculates the co-ordinates of two corresponding reflected points to the right of the Y-axis.

The reflected points to the left of the Y-axis are easily obtained by simply changing the sign of each X co-ordinate.

This is done in PROCtriangles when the triangles are actually drawn.

For those who like to experiment with their own modifications to programs here are a few suggestions.

After some experimentation we have deliberately eliminated black from the colour palette. If you would like to include it, you will need another suitable VDU 19 command on line 80.

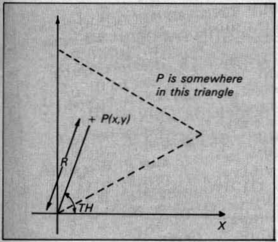
Each basic pattern consists of six coloured triangles. If you would like to experiment with more or less you should change '6', the loop terminating parameter, in line 90.

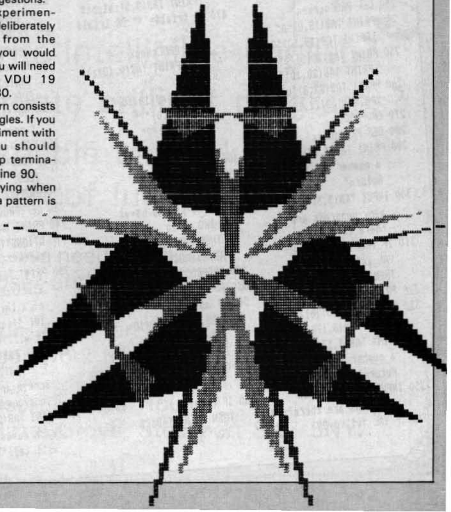
It is rather annoying when the last triangle in a pattern is a large one which blots out a very promising pattern.

There are various strategies which can be employed to avoid this. For instance, SCALE (line 760) can be reduced as the variable L% increases.

The kaleidoscope was originally exclusively produced as a toy. However, it has also had more serious applications as a source of inspiration to designers.

We are sure that after viewing a few of the patterns created on your Electron the reason for this will become evident.





PUZZLE THIS ONE

```
 10 REM COMBINATIONS
 20 REM (C) ELECTRON USER
 30 REM by Pete Bibby
 40 MODE 1
 50 VDU 19,1,4;0;
    :COLOUR 1
    :COLOUR 130
 60 VDU 23,1;0;0;0;0;
 70 CLS
    :PROCinstruct
 80 REPEAT
 90 PROCinit
100 PROCscreen
110 PROCguess
120 UNTIL FALSE
130 END
140 DEF PROCinit
150 count=0
160 CLS
170 a$=STR$ (RND(10) -1)
180 b$=STR$ (RND(10) -1)
190 c$=STR$ (RND(10) -1)
200 target number$=a$+b$+c$
210 blank$=STRING$(40
    ," ")
220 ENDPROC
230 DEF PROCscreen
240 PRINT TAB(18,8)"h"
    :PRINT TAB(18,10)"?"
250 PRINT TAB(20,8)"t"
    :PRINT TAB(20,10)"?"
260 PRINT TAB(22,8)"u"
    :PRINT TAB(22,10)"?"
270 ENDPROC
280 DEF PROCguess
290 PRINT TAB(3,17)" Enter
     a number and press
     Return"
300 INPUT TAB(3,3) "How
     many hundreds are
     there";x$
310 IF VAL (x$)<0 OR
    VAL (x$)>9
    THEN GOTO 300
320 PRINT TAB(18,10) x$
330 PRINT TAB(0,3);blank$
    :PRINT TAB(3,17);blank$
340 PRINT TAB(3,17)" Enter
     a number and press
     Return"
350 INPUT TAB(3,3) "How
     many tens are there";y$
360 IF VAL (y$)<0 OR
    VAL (y$)>9
    THEN GOTO 350
370 PRINT TAB(20,10) y$
380 PRINT TAB(0,3);blank$
    :PRINT TAB(3,17);blank$
390 PRINT TAB(3,17)" Enter
     a number and press
     Return"
400 INPUT TAB(3,3) "How
     many units are there";
    z$
410 IF VAL (z$)<0 OR
    VAL (z$)>9
    THEN GOTO 400
420 PRINT TAB(22,10) z$
430 PRINT TAB(0,3);blank$
    :PRINT TAB(0,12);blank$
    :PRINT TAB(3,17);blank$
440 PRINT TAB(3,3) "Do
     you want to check
     this number?"
450 INPUT TAB(3,5) "Enter
     Y or N and press Retur
    n"trial$
460 PRINT TAB(0,3);blank$
    :PRINT TAB(0,5);blank$
470 IF trial$="Y" OR trial$
    ="y"
    THEN PROCcheck
    ELSE PRINT TAB(0,10);bl
    ank$
    :PRINT TAB(18,10)"?"
     TAB(20,10)"?"
    TAB(22,10)"?"
    :PROCguess
480 ENDPROC
490 DEF PROCcheck
500 count=count+1
510 IF a$=x$ AND b$=y$
     AND c$=z$
    THEN PROCwin
    ELSE PROChint
520 ENDPROC
530 DEF PROChint
540 IF a$<x$
    THEN PRINT TAB(18
    ,12)">"
550 IF b$<y$
    THEN PRINT TAB(20
    ,12)">"
560 IF c$<z$
    THEN PRINT TAB(22
    ,12)">"
570 IF a$>x$
    THEN PRINT TAB(18
    ,12)"<"
580 IF b$>y$
    THEN PRINT TAB(20
    ,12)"<"
590 IF c$>z$
    THEN PRINT TAB(22
    ,12)"<"
600 IF a$=x$
    THEN PRINT TAB(18
    ,12)"="
610 IF b$=y$
    THEN PRINT TAB(20
    ,12)"="
620 IF c$=z$
    THEN PRINT TAB(22
    ,12)"="
630 PROCguess
640 ENDPROC
650 DEF PROCwin
660 CLS
670 PRINT TAB(15,10)"CONGRA
    TULATIONS"
680 PRINT TAB(15,12)" The
     answer is "
690 PRINT TAB(21,14) target
     number$
700 IF count=1 PRINT
    TAB(20,20)"Luck!"
    ELSE PRINT TAB(15
    ,20)"You took ";count;
    " goes."
710 FOR X=1 TO 2000
    :NEXT X
    :CLS
720 ENDPROC
730 DEF PROCinstruct
740 PRINT TAB(13,3) "COMBIN
    ATIONS"TAB(13,4)"******
    ******"
750 PRINT TAB(2,8) "The
     Electron will 'think'
     of a three"TAB(2
    ,10) "figure number.
     It will then display"
760 PRINT TAB(18,12) "?
     ? ?"TAB(2,14)"on the
     screen and wait for
     your guess."
770 PRINT TAB(2,16)"After
     each guess the micro
     will tell"TAB(2,18)
     "you whether the figu
    es you entered"
780 PRINT TAB(2,20)"are
     too high or too low.
     If it's"TAB(2,22)
     "too low then < the
     'less than' sign"
790 PRINT TAB(2,24)"appears
     below that numeral,
     showing"TAB(2,26)
     "that the figure you
     picked is less"
800 PRINT TAB(2,24)"appears
     below that numeral,
     showing"TAB(2,26)
     "that the figure you
     picked is less"
810 PRINT TAB(2,28)"than
     it should be."
820 FOR delay=1 TO 8000
    :NEXT delay
    :CLS
830 PRINT TAB(13,3) "COMBIN
    ATIONS"TAB(13,4)"******
    ******"
840 PRINT TAB(2,8) "Similar
    ly if the figure is
     too high"TAB(2,10)
    "> the 'greater than'
     sign will appear"
850 PRINT TAB(2,12) "below
     it."
860 PRINT TAB(2,14)"If
     the figure is the
     right one then"
    TAB(2,16)"an equals
     sign = will be display
    ed."
870 PRINT TAB(2,18)"You
     can then have another
     go."TAB(2,20)"The
     Electron is keeping
     count and it"
880 PRINT TAB(2,22)"will
     tell you how many
     goes you take"
890 PRINT TAB(2,24)"to
     guess all three digits
     correctly."
900 FOR delay=1 TO 8000
    :NEXT delay
    :CLS
910 ENDPROC
```

UT...

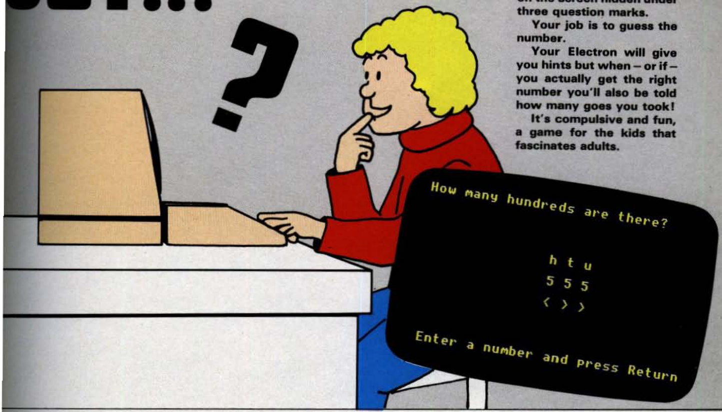
COMBINATIONS is a program that turns your Electron into a puzzle machine.

It puts a secret number on the screen hidden under three question marks.

Your job is to guess the number.

Your Electron will give you hints but when – or if – you actually get the right number you'll also be told how many goes you took!

It's compulsive and fun, a game for the kids that fascinates adults.



```
How many hundreds are there?

h t u
5 5 5
< > >

Enter a number and press Return
```

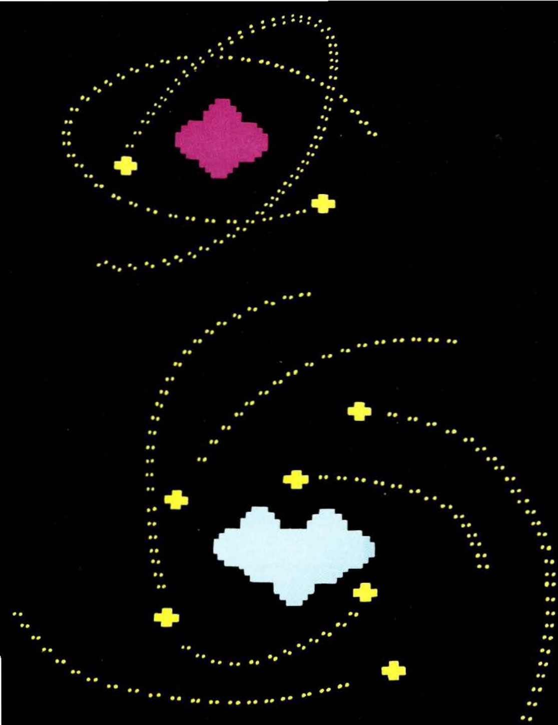
- Can you write intelligible English?
- Can you create brilliant programs?
- Are you capable of working with a bunch of lunatics?

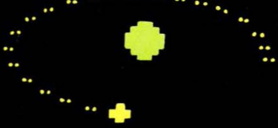
Yes, you've guessed – we need an editorial assistant at Micro User and Electron User!

Send your application, together with examples of your work to:

The Editor, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

MICROCOSMIC MODELS





WELL, not only do you have an Electron, but with Orbit we give you several more.

No, not free micros but an animated model of how the sub-atomic particles called electrons spin round the centre of the atom.

You get models of the Hydrogen, Helium, Beryllium, Carbon and Oxygen atoms displayed on your screen for you to wonder at and to amaze your friends.

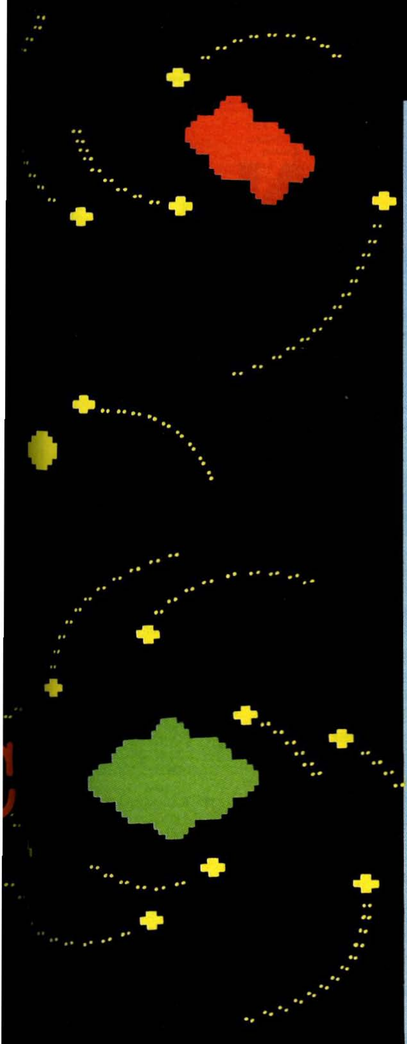
While you're gazing at the screen you might notice that as the number of orbiting electrons goes up the speed goes down.

This illustrates one of the sad facts of using a micro – the more you want on the screen the slower things tend to go.

In order to speed things up integer variables such as P% and J%, are used as much as possible as these help the micro work more quickly.

"But", the more knowledgeable might ask", if you're so concerned with speed why the delay loop in line 360?"

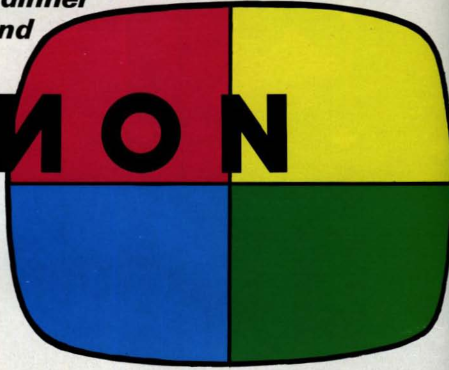
A good question. The answer is that it's there to smooth out the motion of the electrons. Leave it out and the animation will move at full speed.



```
  1 REM Electron orbit
 10 PROCinitial
 20 MODE 5
    :VDU 28,6,30,15,29
 30 VDU 29,640;512;
 40 GCOL 0,3
    :PRINT "HYDROGEN"
    :VDU 5
    :PROCnucleon(-32,32)
 50 PROCorbit(1)
 60 PROCHnucleus(-32,32)
    :VDU 4
    :PRINT " HELIUM"
    :VDU 5
 70 PROCorbit(2)
 80 PROCHnucleus(-96,64)
    :VDU 4
    :PRINT "BERYLLIUM"
    :VDU 5
 90 PROCorbit(4)
100 PROCHnucleus(32,64)
    :VDU 4
    :PRINT " CARBON"
    :VDU 5
110 PROCorbit(6)
120 PROCHnucleus(-32,96)
    :VDU 4
    :PRINT " OXYGEN"
    :VDU 5
130 PROCorbit(8)
140 END
150 DEF PROCnucleon(X%,Y%)
160 MOVE X%,Y%
    :VDU 240
    :MOVE X%,Y%-32
    :VDU 241
170 ENDPROC
180 DEF PROCHnucleus(X%
    ,Y%)
190 GCOL 0,3
    :PROCnucleon(X%,Y%)
200 GCOL 0,1
    :X%=X%-32
    :Y%=Y%-32
    :PROCnucleon(X%,Y%)
210 X%=X%+64
    :PROCnucleon(X%,Y%)
220 GCOL 0,3
    :X%=X%-32
    :Y%=Y%-32
    :PROCnucleon(X%,Y%)
230 ENDPROC
240 DEF PROCorbit(N%)
250 GCOL 3,2
260 FOR J%=0TO N%-1
270 MOVE P%(J%,0,1),P%(J%
    ,0,2)
    :VDU 242
280 NEXT
290 REPEAT
300 FOR I%=1TO 40
310 TIME =0
320 FOR J%=0TO N%-1
330 MOVE P%(J%,I%,1),P%(J%
    ,I%,2)
    :VDU 242
340 MOVE P%(J%,I%-1,1),P%(J%
    ,I%-1,2)
    :VDU 243
350 NEXT
360 REPEAT UNTIL TIME >16
370 NEXT
380 UNTIL INKEY (0)=32
390 FOR J%=0TO N%-1
400 MOVE P%(J%,40,1),P%(J%
    ,40,2)
    :VDU 242
410 NEXT
420 ENDPROC
430 DEF PROCinitial
440 CLS
    :PRINT TAB(0,14)"It takes
     about 30 seconds to
     initialise the array."
450 DIM P%(7,40,2)
460 FOR I%=0TO 40
470 X=500*COS (I%*PI /20)
    :Y=250*SIN (I%*PI /20)
480 A=ATN (Y/X)
    :IF X<0
    THEN A=A-PI
490 R=SQR (X*X+Y*Y)
500 FOR J%=0TO 7
510 P%(J%,I%,1)=R*COS (A+J%*4
    )
    :P%(J%,I%,2)=R*SIN (A+J%*
    4)
520 IF J%<2
    THEN P%(J%,I%,2)=P%(J%
    ,I%,2)/2
    :P%(J%,I%,1)=P%(J%,I%
    ,1)/2
530 NEXT
    :NEXT
    :*FX15,1
540 PRINT "It is ready, press
     space to continue."
    :REPEAT UNTIL INKEY (0)=32
550 VDU 23,240,60,60,126
    ,126,255,255,255,255
560 VDU 23,241,255,255,255
    ,255,126,126,60,60
570 VDU 23,242,24,24,60
    ,60,60,60,24,24
580 VDU 23,243,24,24,60
    ,60,52,60,24,24
590 ENDPROC
```

After Sunday dinner settle down and challenge

SIMON



HAVE you ever played the children's game Simon Said, or its electronic reincarnation, Simon? Well here's a version of the game for your Electron.

The idea of the game is that the screen is divided into quarters.

Each of these is used to display a different colour and each colour has a different note associated with it.

The quarters then light up in a random order, though only one appears on the screen at a time.

After lighting up the various parts of the screen – with appropriate noises – the Electron then dares you to copy it.

You have to use the keyboard keys to reproduce the sequence in the right order.

At first it's easy because there's only a few in the series, but it does get more complicated.

When it's not driving you mad it's great fun! If you make a mistake you go back to the beginning again.

While the game gets progressively harder, you'll find that using the keyboard to type in your replies is easy.

Key A corresponds to the top left of the screen, key S to the top right, key Z the bottom left and key X the bottom right.

Suppose the Electron lights up the top left of the screen, then the bottom right. To copy it you press A then X. Suppose that it then adds the top left of the screen (again) to the sequence. To copy it you must press A, X, then A again.

S will start the whole thing off, R will replay the sequence for you and E will end it.

Anyway it's much easier to play than to write about so why waste your time reading this when you could be getting on with the game?

```
 10 REM SIMON
 20 REM (C)ELECTRON USER
 30 *FX4,1
 40 DIM G%(4),N%(200)
 50 LTH%=0
    :MODE 2
 60 FOR L%=1TO 4
    :READ G%(L%)
    :VDU 19,G%(L%),0,0,0
    ,0
    :NEXT
 70 FOR L%=1TO 4
    :READ A,B,C,D
    :VDU 28,A,B,C,D
    :COLOUR G%(L%)
    :CLS
    :NEXT
 80 VDU 5
    :GCOL 0,134
    :MOVE 400,500
    :PRINT "R=replay"
    :MOVE 400,600
    :PRINT "S=start"
    :MOVE 400,700
    :PRINT "E=end"
 90 VDU 19,6,6,0,0,0
    :IF INKEY (-35)
    THEN 110
    ELSE IF INKEY (-82)
    THEN 140
    ELSE IF INKEY (-52)
    AND LTH%<>0
    THEN 100
    ELSE 90
100 VDU 19,6,0,0,0,0
    :DELAY%=1000
    :FOR B%=1TO LTH%
    :X%=N%(B%)
    :PROCSQUARE
    :NEXT
    :GOTO 90
110 DELAY%=100
    :FOR X%=1TO 4
    :PROCSQUARE
    :NEXT
    :FOR L%=1TO 400
    :NEXT
    :MODE 6
    :PRINT ''
    :*FX15
120 *FX4
130 END
140 VDU 19,6,0,0,0,0
    :LTH%=0
150 FOR L%=1TO 1500
    :NEXT
    :DELAY%=800
    :X%=RND(4)
    :LTH%=LTH%+1
    :N%(LTH%)=X%
    :FOR B%=1TO LTH%
    :X%=N%(B%)
    :PROCSQUARE
    :NEXT
    :FOR B%=1TO LTH%
    :*FX15
160 TIME =0
170 A$=INKEY$ (1)
    :IF A$=""AND TIME <200
    THEN 170
    ELSE IF TIME >200
    THEN B%=300
    :GOTO 240
180 ON N%(B%)GOTO 190 ,200
    ,210 ,220
190 IF A$="A"
    THEN X%=1
    :GOTO 230
    ELSE B%=300
    :GOTO 240
200 IF A$="S"
    THEN X%=2
    :GOTO 230
    ELSE B%=300
    :GOTO 240
```

● *Turn to Page 12*

LOW
MILEAGE
A BARGAIN AT—
£500 cash
or £50 deposit +
£28 per month over 2 years
Can you afford to
miss this offer??
Joe's
Quality
Used
Cars
EU 4

DO interest rates puzzle you? Would you like to know just how much you're actually paying for the things you buy on credit?

***Electron User* comes to your aid with this helpful listing. It's easy to type in and even easier to use.**

Taking an interest

By MARGARET JAMES

```
YOUR ACCOUNT IS AS FOLLOWS

TO BE PAID IN 5 YEAR/S

INTEREST RATE                10.00%

TOTAL INTEREST               £50.00

MONTHLY PAYMENTS OF           £2.50

TOTAL COST                  £150.00


ANY MORE(Y/N)?
```

```
10 REM **MARGARET JAMES**
20 REM ** H/P INTEREST **
25 REM ** (C) ELECTRON
   USER **
30 MODE 6
40 COLOUR 0
50 COLOUR 131
60 VDU 23;8202;0;0;0
70 PRINT
80 CLS
90 PRINT '"THIS IS A PROGRAM
    TO WORK OUT INTEREST"
100 PRINT "AND COST OF ANY
    LOANS YOU WISH TO HAVE"
110 PRINT
120 INPUT "COST OF ITEM "A
130 INPUT "INTEREST RATE
    %"B
140 INPUT "HOW MANY YEARS
    WILL YOU NEED TO PAY?
    "D
150 C=A*(B/100)
160 G=(C*D)+A
170 E=G/D
180 PRINT "HOW DO YOU WISH
    TO PAY?"
190 PRINT "ENTER 1 FOR MONTHL
    Y"
200 PRINT "ENTER 2 FOR WEEKLY
    "
210 INPUT M$
220 CLS
230 PRINT ''" YOUR ACCOUNT
    IS AS FOLLOWS "
240 PRINT '" TO BE PAID
    IN ";D;" YEAR/S"
250 @%=131594
260 PRINT '" INTEREST RATE
    "TAB(28);B"%"
270 PRINT '" TOTAL INTEREST
    "TAB(28)"£";C*D
280 IF M$ = "1"
    THEN 320
    ELSE 290
290 IF M$ = "2"
    THEN 340
300 IF M$ = < "1"OR M$ =
    > "2"
    THEN GOTO 310
310 CLS
    :GOTO 190
320 PRINT '" MONTHLY PAYMENTS
    OF "TAB(28)"£";E/12
330 GOTO 350
340 PRINT '" WEEKLY PAYMENTS
    OF "TAB(28)"£";E/52
350 PRINT ' " TOTAL COST
    "TAB(28)"£";G
360 PRINT
    :PRINT
    :PRINT
370 @%=10
380 INPUT "ANY MORE(Y/N)"
    ,R$
390 IF R$="Y"
    THEN RUN
400 END
```

Software

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASE

CYLON ATTACK
A&F Software

This space action game is outstanding

PICTURE it. You're the only interceptor pilot on board an Earth supply ship. The alarm goes. The Cylons are attacking, wave after relentless wave determined to stop you getting through.

You launch into space away from the safety of the mother ship to try and destroy as many of the enemy as you can before your shields give way or your fuel runs out.

Your eyes search the long range scanners for a glimpse of the enemy before they stoop to attack, curving and weaving to avoid your defence systems.

That's the scenario for Cylon Attack, the compulsive new game from A&F Software. You play the part of the interceptor pilot, struggling to get the Cylon ships in your sights so your lasers can lock on to them.

The screen of your micro becomes the view from the cockpit. Ranged around it are the instruments. They show the state of the lasers, your fuel, your rates of turn and spin, and a long range radar scanner.

This scanner is not just decoration, but really helps you to track down and destroy the enemy. The 3-D effect has to be seen to be believed: the aliens loom out of deep space, growing larger as they approach to attack distance.

The game is quite simply excellent, with lots more features than can be described here. The graphics leave most other games standing. And, as usual from A&F, the instructions are simple but thorough.

The only problem is that I can't find anything about it to criticise. It really is that good, and sets the standard by which action games will be judged. Thoroughly recommended.

Trevor Roberts

HOROSCOPES
Third Program

Fun and fund-raising – fates for fêtes

IF you're like me you'll realise that all horoscopes are a load of rubbish and that no one in their right mind would believe them.

This doesn't, however, stop me reading them avidly, especially when they say nice things about my star sign and promise a rosy future.

From this you'll understand that I was hooked as soon as Horoscope came into the office.

I loaded it up all eager expectation, but sadly I was a little disappointed as I found it rather limited.

Despite the title you don't actually get a forecast of the future, just a description of your personality traits.

When you run the program it askes you for your name, date of birth and sex, and then prints out the personality profile of your star sign. All interesting stuff and good fun.

The trouble is that the profile for each star sign is the same whichever sex you are and whatever day you were born on.

This means is that there are only really 12 profiles, one for each sign. This makes it fairly limited for home use.

Having said that, the program looks ideal for fund-raising at fetes, jumble sales and school open days. I can see it making a fortune for good causes.

Peter Gray

Tackle

FELIX IN THE FACTORY
Program Power

YOU know what it's like – you go into work for your shift and no one else has turned up so it's all left to you. Again . . .

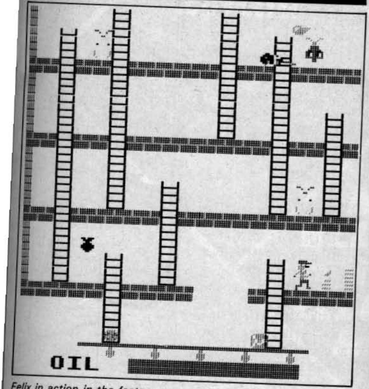
Well that's what's facing you as you play the part of

Simon listing

From Page 10

```
210 IF A$="Z"
    THEN X%=3
    :GOTO 230
    ELSE B%=300
    :GOTO 240
220 IF A$="X"
    THEN X%=4
    :GOTO 230
    ELSE B%=300
    :GOTO 240
230 DELAY%=250
    :PROCSQUARE
240 NEXT
    :IF B%=301
    THEN FOR L%=50TO 100
    STEP 2
    :SOUND 1,-15,L%,1
    :SOUND 1,-15,100-L%
    ,1
    :NEXT
    :GOTO 90
    ELSE 150
250 DEF PROCSQUARE
    :VDU 19,G%(X%),G%(X%)
    ,0,0,0
    :SOUND 1,-15,100+(X%*5)
    ,1
260 SOUND 1,-15,100+(X%*10)
    ,1
    :FOR L%=1TO DELAY%
    :NEXT
270 VDU 19,G%(X%),0,0,0
    ,0
    :FOR L%=1TO 70
    :NEXT
    :ENDPROC
280 DATA 131,132,129,130
    ,0,14,9,0,10,14,19,0
    ,0,30,9,15,10,30,19
    ,15
```

Surgery



Felix in action in the factory – oiling the wheels of industry

gremlins and giant mice

Felix, the hero of this game.

Your main job is to keep the generator oiled.

Easy enough, but the previous shift has left the oil cans all over the factory and you have to collect them before you can oil it and keep everything running smoothly.

This is where the work comes in.

The factory is a split level affair, the different levels being joined by ladders. Before you are able to collect the oil cans you have to negotiate a package-carrying conveyor belt.

It doesn't help that the place is infested with Gremlins and giant mice which attack you without warning or provocation.

Of course you can use the pitchfork and the bags of poison that are lying around the place to ward them off but all this takes time and the generator is running out of oil every second.

And when you've succeeded your only reward is a still harder game!

It's not easy but it is fun, a fast game calling for quick reflexes and a sense of humour as you keep production flowing.

The instructions are clear and adequate, the controls simple and easy to use. The program's sound and graphics use the Electron's capabilities to the full.

All-in-all it's a good version of an old idea, and children love it. If you want an amusing action game for your Electron then Felix in the Factory is one to be considered.

Eileen Young

BOOKSHELF

The Electron Programmer
S.M. Gee and Mike James

THE launch of a new micro always results in a rush of books about it. The choice can become quite bewildering.

This is especially so in the case of the Acorn Electron as it's so ideally suited for a first micro.

This means that a lot of the people looking for books about it will have no previous experience to help them pick a book to meet their needs.

Because of this the appearance of The Electron Programmer is doubly welcome.

Firstly, it's a good read about an excellent micro and secondly it's a book which I can wholeheartedly recommend for the beginner.

It starts with the usual "What is a micro and how do you set it up?" It then goes on to the inevitable PRINT and LET.

All this is pretty traditional but then the authors break the mould.

They move straight on to a discussion of looping and choice, showing how the flow of control can be affected by the Basic structures used in a program.

The chapter on procedures and functions follows on from this, then comes a brief but useful section on handling strings and numbers on the micro.

The graphics abilities of the Electron aren't ignored, nor are its sound facilities. Each aspect is well covered and illustrated with a simple game.

The book finishes with a short but well explained treatment of logic and a chapter on better programming.

The style of the book falls between that of the two you found in the box with your new Electron.

It's both more readable than the User Guide (though obviously not as comprehensive) and more adult than the Yazdani tome.

This will make it appeal to those who find the guide a little too technical but don't want to be talked down to.

All the way through the text the principles of good programming are illustrated with short but illuminating programs.

These are easy to type in and also encourage experiment.

I must warn, however, that there are a couple of typing errors which, although easy to spot, can be a bit confusing for a while.

The authors' aim is to teach complete newcomers how to write well structured, easy to understand Basic programs in a logical and coherent manner.

THE ELECTRON PROGRAMMER
S.M.GEE AND MIKE JAMES

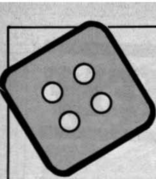
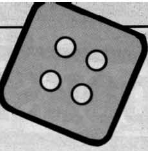
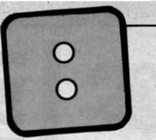
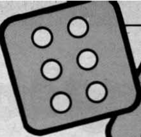
Happily, they don't attempt to produce a rephrased, watered-down user guide but instead concern themselves with teaching the principles of good programming on the Electron.

Basic keywords and structures are introduced as necessary to illustrate these points, each being explained simply and lucidly.

This is where the book succeeds. Reading it a beginner will not only achieve a reasonably thorough command of Electron Basic but also have gained insight into the whys and wherefores of good programming.

Well worth considering.

Nigel Peters

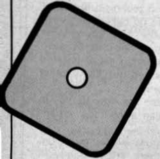
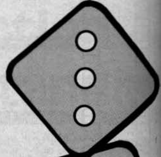
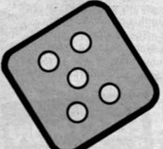
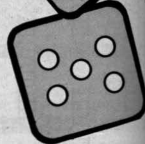
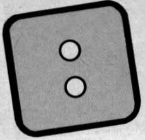
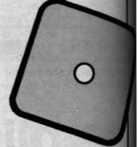
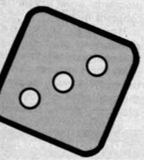
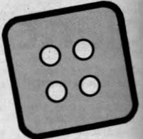
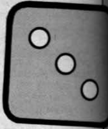





DIGITAL DICE

HAVE you ever played a game that uses dice and had your doubts about the honesty of your opponents?

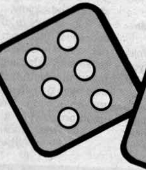
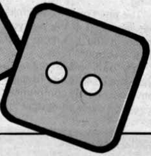
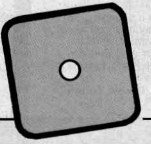
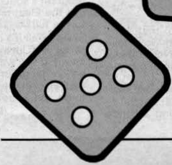
Well with Digital Dice your Electron will roll them for you, fairly and randomly.

And blowing on the micro doesn't help!

```
 10 REM DICE
 20 REM (C)ELECTRON USER
 30 MODE 1
 40 COLOUR 129
    :COLOUR 2
 50 PRINT TAB(5,4)"PSEUDO
     RANDOM DICE GENERATOR"
 60 PRINT TAB(8,6)"FOR THE
     ACORN ELECTRON"
 70 PRINT TAB(8,8)"(c) ELECTR
    ON USER 1983"
 80 PRINT TAB(0,24);"PRESS
     ANY KEY TO START";
 90 G=GET
100 dummy=RND(-TIME )
110 REPEAT
120 PROCdice
130 PRINT TAB(0,24)"Throw
     again (Y/N)";
140 UNTIL GET$ ="N"
150 END
160 DEF PROCdice
170 COLOUR 128
180 CLS
190 COLOUR 129
200 PROCthrow
210 RESTORE
220 FOR N%=1 TO dice1
230 READ up$,mid$,low$
240 NEXT N%
250 PRINT TAB(4,10);up$;
    TAB(4,11);"     ";
    TAB(4,12);mid$;TAB(4
    ,13);"     ";TAB(4,14);lo
    w$
```

```
260 RESTORE
270 FOR N%=1 TO dice2
280 READ up$,mid$,low$
290 NEXT N%
300 PRINT TAB(20,10);up$;
    TAB(20,11);"     ";
    TAB(20,12);mid$;TAB(20
    ,13);"     ";TAB(20
    ,14);low$
310 COLOUR 128
320 PRINT TAB(6,18);dice1;
    TAB(22,18);dice2
330 IF dice1=dice2
    THEN PRINT TAB(9,16);
    "Doubles Up!";
340 ENDPROC
350 DEF PROCthrow
360 FOR throw=1 TO 6
370 dice1=RND(6)
380 dice2=RND(6)
390 NEXT throw
400 ENDPROC
410 DATA "     "," $ "
    ,"     "
420 DATA "$    ","    $"
    ,"    $"
430 DATA "$    "," $ "
    ,"    $"
440 DATA "$   $","    "
    ,"$   $"
450 DATA "$   $"," $ "
    ,"$   $"
460 DATA "$   $","$   $"
    ,"$   $"
```

Eye of Zolton
Five Stones of Anadon
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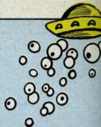
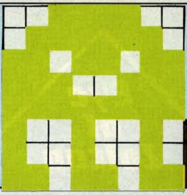
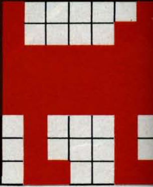
Casting Agency



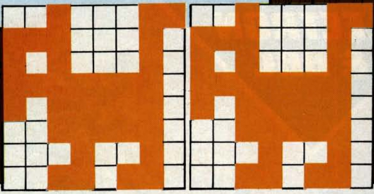


The Alien

```
VDU 23,226,60,126,219,231,
255,146,146,219
```

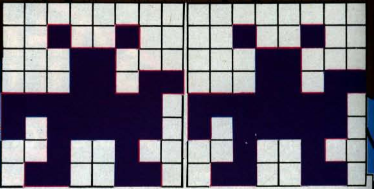


Fido the d



Rover the dog

```
VDU 23,227,35,226,162,254,
190,62,18,54
```



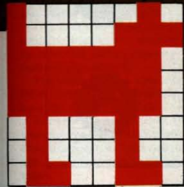
Jo the cat

```
VDU 23,224,36,24,27,254,
190,36,102,0
```

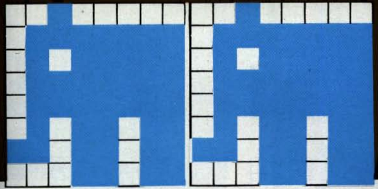
THIS month's Casting Agency features a whole Noah's Arkful of creatures devised by the girls of class 4S, Inglewood Junior School, Carlisle. So thanks from *Electron User* to Caroline, Margaret, Morven, Wendy, Tracy and Helen. (And a special thanks to Dawn whose shape didn't quite scrape in.)

At *Electron User* we're having fierce arguments about Fido and Rover. We know one of them is pedigree – we just can't agree which!

HAVE you a favourite character you would like to see this monthly feature in Electron User? Send your drawing of the character, together with the VDU23 statement, to: Shape Dictionary, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

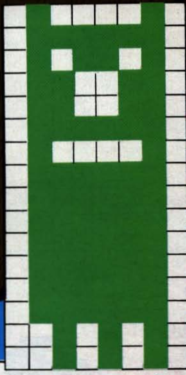


```
VDU 23,228,130,135,254,254,
254,68,68,102
```



Dumbo the elephant

```
VDU 23,225,32,127,95,127,
127,91,219,27
```



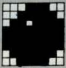
The Monster

```
VDU 23,229,66,126,90,102,
102,126,66,126
VDU 23,230,126,126,126,126,
126,126,42,42,0
```

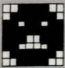
Going

Heads

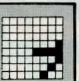
```
VDU 23,227,28,62,111,
255,255,255,126,60
```



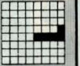
```
VDU 23,228,60,126,219,
255,231,195,126,60
```



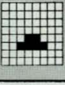
```
VDU 23,224,0,0,0,
1,15,1,2,4
```



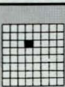
```
VDU 23,225,0,0,0,
1,15,0,0,0
```



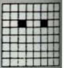
```
VDU 23,226,0,0,0,
0,24,60,0,0
```



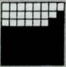
```
VDU 23,229,0,0,16,
0,0,0,0,0
```



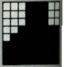
```
VDU 23 230,0,0,36,
0,0,0,0,0
```



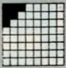
```
VDU 23,231,28,28,28,
63,127,255,255,255
```



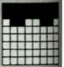
```
VDU 23,233,0,1,255,
255,255,255,255,255
```

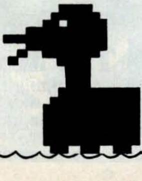


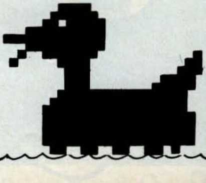
```
VDU 23,232,255,255,
102,0,0,0,0,0
```



```
VDU 23,234,224,192,
128,0,0,0,0,0
```







Quackers!

JOHN HARPER suggests a way to get your characters moving

HAVE you ever wondered how to make the characters from Casting Agency come alive?

Well, Quackers shows you one way of doing it.

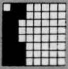
The Electron User duck waddles across the screen by selective use of cleverly defined characters.

The listing uses lots of REM statements to explain how the program works.

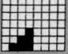
Remember, you don't have to type the REMs in. They are there to help you – but your Electron ignores them.

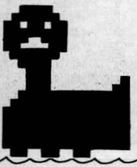
Body Bits

VDU 23,235,96,224,192,
192,192,224,224,224



VDU 23,236,0,0,0,0,
0,16,48,112

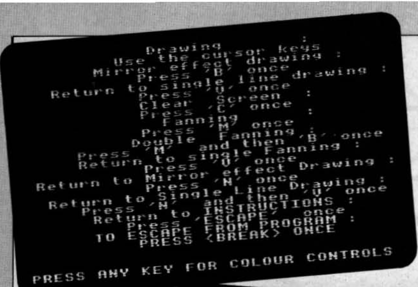




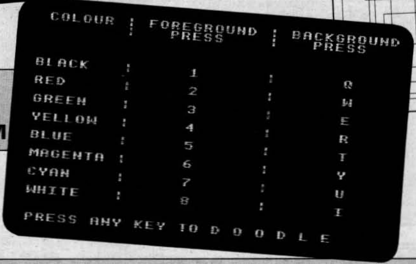
```
10 REM (C) ELECTRON USER

20 REM JOHN HARPER
30 MODE 2
40 REM Cursor off-----------
   ---------
50 VDU 23;8202;0;0;0;
60 REM Background blue------
   ---------
70 VDU 18,0,132
80 REM Define shapes--------
   ---------
90 VDU 23,224,0,0,0,1,15
   ,1,2,4
100 VDU 23,225,0,0,0,1,15
   ,0,0,0
110 VDU 23,226,0,0,0,0,24
   ,60,0,0
120 VDU 23,227,28,62,111
   ,255,255,255,126,60
130 VDU 23,228,60,126,219
   ,255,231,195,126,60
140 VDU 23,229,0,0,16,0
   ,0,0,0,0
150 VDU 23,230,0,0,36,0
   ,0,0,0,0
160 VDU 23,231,28,28,28
   ,63,127,255,255,255
170 VDU 23,232,255,255,102
   ,0,0,0,0,0
180 VDU 23,233,0,1,255,255
   ,255,255,255,255
190 VDU 23,234,224,192,128
   ,0,0,0,0,0
200 VDU 23,235,96,224,192
   ,192,192,224,224,224
210 VDU 23,236,0,0,0,0,0
   ,16,48,112
220 CLG
230 X=15
   :Y=10
240 REM Print duck as text
    on blue text background
    with alternate beaks
    and delay before erasure
    and print of next compos
   ite--------
250 REPEAT
260 ENVELOPE 1,2,2,2,2,0
   ,8,8,126,0,0,-126,126
   ,126
270 SOUND &0011,1,40,4
280 REM Move print position
    of duck----
290 VDU 31,X,Y
300 VDU 17,132
310 VDU 17,3,224,17,2,227
   ,10,8,17,0,231,233,11
   ,236,10,8,235,10,8,234
   ,8,8,8,232,232
320 PROCDelay
330 VDU 9,127,127,127,11
   ,9,9,9,127,127,127,11
   ,9,9,9,127,127,127,127
340 VDU 8,17,3,225,17,2
   ,227,10,8,17,0,231,233
   ,11,236,10,8,235,10
   ,8,234,8,8,8,232,232


350 PROCDelay
360 VDU 9,127,127,127,11
   ,9,9,9,127,127,127,11
   ,9,9,9,127,127,127,127
370 X=X-2
   :IF X<0
   THEN X=X+19
380 REM Value of A,split
    point,and resultant
    values of Y will determi
   ne degree of bias in
    upward or downward
    movement---
390 A=RND(6)
400 IF A<3
   THEN Y=Y-RND(3)
410 IF A>=3
   THEN Y=Y+RND(2)
   :IF Y>=28
   THEN Y=1
420 UNTIL FALSE
430 DEF PROCDelay
440 FOR A=1TO 235
450 NEXT
460 ENDPROC
```

Zip pa
doodl

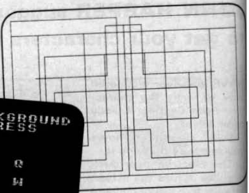
By MARK WHITHAM



```
                    Drawing         :
            Use the cursor keys
          Mirror effect drawing :
                Press 'B' once
      Return to single line drawing :
                Press 'U' once
                Clear Screen    :
                Press 'C' once
                   Fanning      :
                Press 'M' once
           Double Fanning       :
           'M' and then 'B' once
       Press                     :
       Return to single Fanning
                Press 'U' once
                effect Drawing :
  Return to Mirror 'N' once
                Press
                     Line Drawing :
   Return to Single  then 'U' once
       Press 'N' and
     Return to INSTRUCTIONS   :
         Press 'ESCAPE' once
    TO ESCAPE FROM PROGRAM :
         PRESS <BREAK> ONCE

PRESS ANY KEY FOR COLOUR CONTROLS
```



```
   COLOUR  !  FOREGROUND  !  BACKGROUND
                PRESS          PRESS

 BLACK     :      1       :      Q
 RED       :      2       :      W
 GREEN     :      3       :      E
 YELLOW    :      4       :      R
 BLUE      :      5       :      T
 MAGENTA   :      6       :      Y
 CYAN      :      7       :      U
 WHITE     :      8       :      I

PRESS ANY KEY TO D O O D L E
```



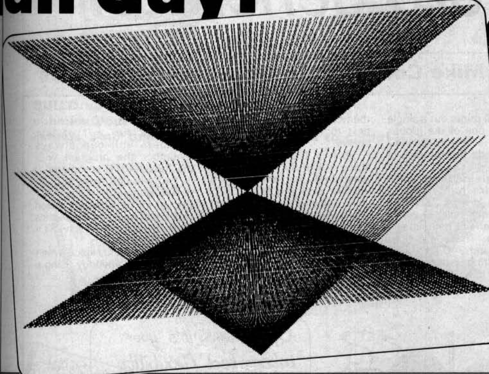
DOODLE BUG allows you to use your Electron as an electronic sketch pad.

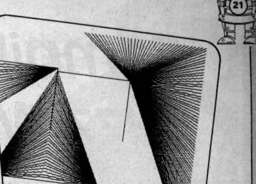
With it you can create an unlimited number of colourful patterns.

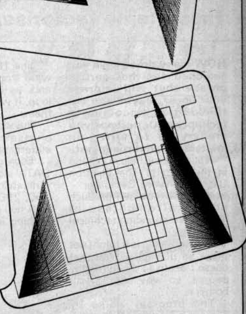
It's relaxing – and it's fun!

```
 10 REM (C) ELECTRON USER
 20 ON ERROR MODE 1
    :PROCINST
    :GOTO 40
 30 MODE 1
    :PROCHEADER
    :PROCINST
 40 N=130
 50 C=0
 60 MODE 0
 70 VDU 5
 80 *FX15,1
 90 CLG
100 MOVE 640,500
110 X=600
    :Y=500
120 PLOT 69,X,Y
130 Y1=Y
    :X1=X
140 IF INKEY (-58)
    THEN Y=Y+15
    :GOTO 390
150 IF INKEY (-42)
    THEN Y=Y-15
    :GOTO 390
160 IF INKEY (-26)
    THEN X=X-15
    :GOTO 390
170 IF INKEY (-122)
    THEN X=X+15
    :GOTO 390
180 IF INKEY (-50)
    THEN VDU 19,1,1;0;
    :GOTO 140
190 IF INKEY (-18)
    THEN VDU 19,1,2;0;
    :GOTO 140
200 IF INKEY (-19)
    THEN VDU 19,1,3;0;
    :GOTO 140
210 IF INKEY (-20)
    THEN VDU 19,1,4;0;
    :GOTO 140
220 IF INKEY (-53)
    THEN VDU 19,1,5;0;
    :GOTO 140
230 IF INKEY (-37)
    THEN VDU 19,1,6;0;
    :GOTO 140
240 IF INKEY (-22)
    THEN VDU 19,1,7;0;
    :GOTO 140
250 IF INKEY (-49)
    THEN VDU 19,1,0;0;
    :GOTO 140
260 IF INKEY (-83)
    THEN 90
270 IF INKEY (-86)
    THEN N=130
    :GOTO 460
280 IF INKEY (-102)
    THEN N=140
    :GOTO 460
290 IF INKEY (-34)
    THEN VDU 19,0,1;0;
    :GOTO 130
300 IF INKEY (-35)
    THEN VDU 19,0,2;0;
    :GOTO 130
310 IF INKEY (-52)
    THEN VDU 19,0,3;0;
    :GOTO 130
320 IF INKEY (-36)
    THEN VDU 19,0,4;0;
    :GOTO 130
330 IF INKEY (-69)
    THEN VDU 19,0,5;0;
    :GOTO 130
340 IF INKEY (-54)
    THEN VDU 19,0,6;0;
    :GOTO 130
350 IF INKEY (-38)
    THEN VDU 19,0,7;0;
    :GOTO 130
360 IF INKEY (-17)
    THEN VDU 19,0,0;0;
    :GOTO 130
370 IF INKEY (-101)
    THEN C=1
380 IF INKEY (-100)
    THEN C=0
390 IF X<10
    THEN X=10
400 IF X>1200
    THEN X=1200
    ELSE IF C=1 AND X>600
     X=600
410 IF Y<10
    THEN Y=10
420 IF Y>1000
    THEN Y=1000
430 DRAW X,Y
440 IF C=1 MOVE 1200-X1
    ,Y1
    :DRAW 1200-X,Y
    :MOVE X,Y
450 GCOL 0,7
    :DRAW X1,Y1
460 GOTO N
470 DEF PROCINST
480 *FX15,0
490 VDU 23;8202;0;0;0;
500 COLOUR 1
510 PRINT TAB(8,4)" D O
     O D L E   B U G "
520 COLOUR 2
530 PRINT ''"This program
     enables the user to
    draw"'"on the screen,u
    sing straight lines."
540 PRINT '''''
550 COLOUR 3
560 PRINT "   PRESS ANY
     KEY FOR CONTROLS
```

de doodle, all day!







```
      ";
570 A$=GET$
    :CLS
580 COLOUR 3
    :PRINT 'TAB(8);"
     Drawing        : "
590 COLOUR 2
    :PRINT TAB(8);" Use
     the cursor keys"
600 COLOUR 3
    :PRINT TAB(6);" Mirror
     effect drawing : "
610 COLOUR 2
    :PRINT TAB(11)"Press
     'B' once"
620 COLOUR 3
    :PRINT TAB(2);" Return
     to single line drawing
     :"
630 COLOUR 2
    :PRINT TAB(11)"Press
     'V' once"
640 COLOUR 3
    :PRINT TAB(8);"   Clear
      Screen  : "
650 COLOUR 2
    :PRINT TAB(11)"Press
     'C' once "
660 COLOUR 3
    :PRINT TAB(8);"
      Fanning      : "
670 COLOUR 2
    :PRINT TAB(11)"Press
     'M' once"
680 COLOUR 3
    :PRINT TAB(8);"  Double
      Fanning : "
690 COLOUR 2
    :PRINT TAB(5)"Press
     'M'  and then 'B'
     once"
700 COLOUR 3
    :PRINT TAB(4);" Return
     to single Fanning
     : "
710 COLOUR 2
    :PRINT TAB(11)"Press
     'V' once"
720 COLOUR 3
    :PRINT TAB(0);" Return
     to Mirror effect Drawi
     ng : "
730 COLOUR 2
    :PRINT TAB(11)"Press
     'N' once"
740 COLOUR 3
    :PRINT TAB(2);"Return
     to Single Line Drawing
     : "
750 COLOUR 2
    :PRINT TAB(5)"Press
     'N'  and then 'V'
     once"
760 COLOUR 3
    :PRINT TAB(5);" Return
     to INSTRUCTIONS : "
770 COLOUR 2
    :PRINT TAB(9)"Press
     'ESCAPE'  once"
780 COLOUR 3
    :PRINT TAB(5);" TO
     ESCAPE FROM PROGRAM
     : "
790 COLOUR 2
    :PRINT TAB(10);"PRESS
     <BREAK> ONCE"
800 COLOUR 1
    :PRINT ''"PRESS ANY
     KEY FOR COLOUR CONTROL
     S";
810 A$=GET$
    :CLS
820 COLOUR 1
    :PRINT '"    COLOUR
     | FOREGROUND | BACKGRO
     UND"'"           |
       PRESS    |    PRESS"
    :COLOUR 2
830 RESTORE
    :FOR I=1TO 8
    :READ C$,FK$,BK$
840 PRINT TAB(3,(4+(I*2)));
    C$;;TAB(11,(4+(I*2)));
    "|     ";FK$;TAB(24
    ,(4+(I*2)));"|
      ";BK$
850 NEXT
860 COLOUR 3
    :PRINT ''TAB(2)" PRESS
     ANY KEY TO D O O D
     L E   "
870 A$=GET$
    :ENDPROC
880 DATA BLACK,1,Q,RED
    ,2,W,GREEN,3,E,YELLOW
    ,4,R,BLUE,5,T,MAGENTA
    ,6,Y,CYAN,7,U,WHITE
    ,8,I
890 DEF PROCHEADER
900 VDU 23;8202;0;0;0;
910 COLOUR 2
    :PRINT ''"
     D O O D L E    B U
     G "
920 COLOUR 3
    :PRINT '''TAB(18);
    "by"
930 COLOUR 1
    :PRINT '''TAB(12);
    "Mark  Whitham"
940 TIME =0
    :REPEAT UNTIL TIME >500
    :CLS
    :ENDPROC
```

Compile your own Buzz Word Generator

Inscrutable vectoriser Mike Cook obfuscates excessive integers

HOW many times have you searched for that certain phrase that will impress your boss? Maybe you are thinking of becoming a technocrat. Or perhaps you are trying to write an impressive advertisement.

Not to worry, help is at hand in the form of The Electron User Buzz-Word Generator.

With this you can produce phrase after phrase of impressive-sounding technical jargon.

The only snag is it might not mean all that much. But that doesn't seem to put off many people, so why should you bother?

The program works by gathering words from three groups of data statements into an array. This is done in lines 10-100.

These are placed into the two-dimensional string variable WORD$. The first two groups consist of adjectives and the third of nouns.

A note of how many words are in each group is kept in the array called MAX.

This structure is used to allow you to add your own words without the need to alter any of the program.

Lines 110-210 generate the phrase from the buzz words by picking a random word out of each group.

Line 160 prints out a single word from one of the groups and, as it is in a FOR/NEXT loop, it will do this for each of them.

The words used to form the phrases are held in data statements in lines 220-340.

Each group finishes with a DATA statement containing a null string. These are lines 250, 290 and 340.

A null string is a string with nothing in it, as indicated by the two quotation marks being next to each other (note no space).

This is the same as the string in line 80. If a space is typed here then the program will not work properly.

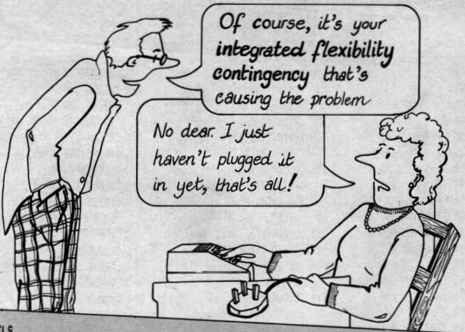
To add your own words, just insert extra lines with DATA statements containing your new words.

For example, if you want to add more nouns (third group) add your extra lines between lines 300 and 340.

If you run out of line numbers you can always renumber the program with the RENUMBER command.

You will find many a good phrase generated. One that I like a lot is: "Synchronised reciprocal concept." It sounds great, even though I haven't a clue what it means.

But, as I said, since when did that stop anybody using a phrase?


Of course, it's your integrated flexibility contingency that's causing the problem
No dear. I just haven't plugged it in yet, that's all!

```
 10 REM THE ELECTRON USER
     BUZZ-WORD GENERATOR
 20 DIM WORD$(3,100),MAX(3)
 30 FOR A%=1 TO 3
 40 M%=0
 50 REPEAT
 60 M%=M%+1
 70 READ WORD$(A%,M%)
 80 UNTIL WORD$(A%,M%)=
    ""
 90 MAX(A%)=M%-1
100 NEXT
110 REPEAT
120 CLS
130 PRINT TAB(0,4);"BUZZ-WO
     RD GENERATOR"
140 PRINT TAB(0,10)
150 FOR A%=1 TO 3
160 PRINT WORD$(A%,
     RND(MAX(A%)));" ";
170 NEXT
180 PRINT
190 PRINT TAB(0,20);"PRESS
     ANY KEY FOR ANOTHER
     PHRASE"
200 A%=GET
210 UNTIL FALSE
220 DATA INTEGRATED,SYNCHRO
     NISED,RESPONSIVE,PARALL
     EL,BALANCED
230 DATA TOTAL,FUNCTIONAL
     ,USER-FRIENDLY
240 DATA OPTIMAL,COMPATIBLE
     ,NEW, SIXTEEN-BIT
250 DATA ""
260 DATA MANAGERIAL,ORGANIS
     ATIONAL,MONITORED
270 DATA RECIPROCAL,DIGITAL
     ,LOGISTICAL
280 DATA TRANSITIONAL
     ,INCREMENTAL,FIFTH-GENE
     RATION
290 DATA ""
300 DATA POLICY,OPTIONS
     ,FLEXIBILITY
310 DATA CAPABILITY,MOBILIT
     Y,PROGRAMMING
320 DATA CONCEPT,TIME-PHASE
     ,PROJECTION
330 DATA HARDWARE,SOFTWARE
     ,CONTINGENCY
340 DATA ""
```

SOUNDS.. EXCITING

BUILD up a library of exciting sounds to enhance your own programs with these listings. And many more in the months to come!

ALARM
DANGER

ALARM

```
ENVELOPE 1,5,1,2,80,15,
0,0,126,0,0,-126,126,126

SOUND 1,1,280,100
```

ROAD WORKS

```
ENVELOPE 5,1,70,16,0,31,
0,0,126,0,0,-126,126,126

SOUND 0,5,80,200
```

WARSHIP'S SIREN

```
ENVELOPE 2,1,5,0,0,25,
0,0,126,0,0,-126,126,126

SOUND 1,2,40,12
```

MACHINE GUN

```
ENVELOPE 3,3,6,4,6,2,
0,0,126,0,0,-126,126,126

SOUND 1,3,4,48
```

THE MARTIANS APPROACH

```
ENVELOPE 4,12,10,8,6,4,
0,0,126,0,0,-126,126,126

SOUND 0,4,4,40
```

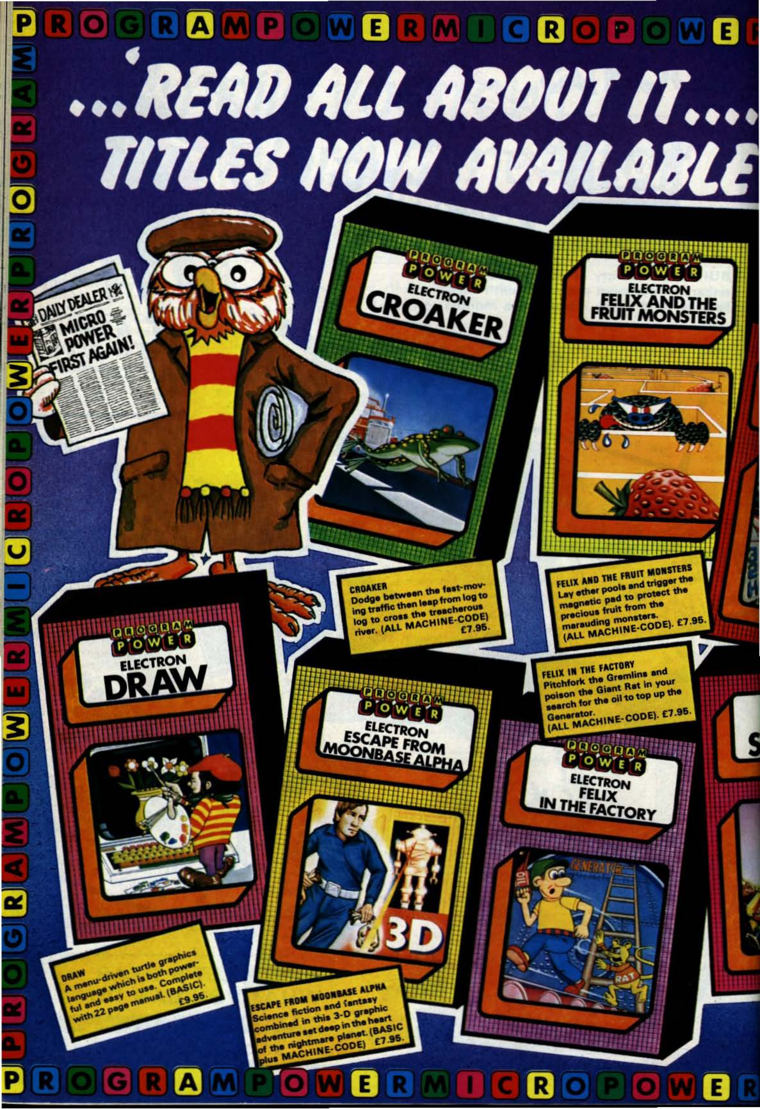
ALARM CLOCK

```
ENVELOPE 6,1,70,16,2,2,
0,0,126,0,0,-126,126,126

SOUND 1,6,100,200
```

NOW – LET'S HEAR WHAT YOU CAN DO

Send your own exciting sounds to: Sounds Exciting, Electron User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

...READ ALL ABOUT IT.... TITLES NOW AVAILABLE


PROGRAMPOWERMICROPOWER
DAILY DEALER
MICRO POWER FIRST AGAIN!
PROGRAM POWER
ELECTRON
CROAKER
PROGRAM POWER
ELECTRON
FELIX AND THE FRUIT MONSTERS
PROGRAM POWER
ELECTRON
DRAW
PROGRAM POWER
ELECTRON
ESCAPE FROM MOONBASE ALPHA
3D
PROGRAM POWER
ELECTRON
FELIX IN THE FACTORY
GENERATOR
OIL
RAT

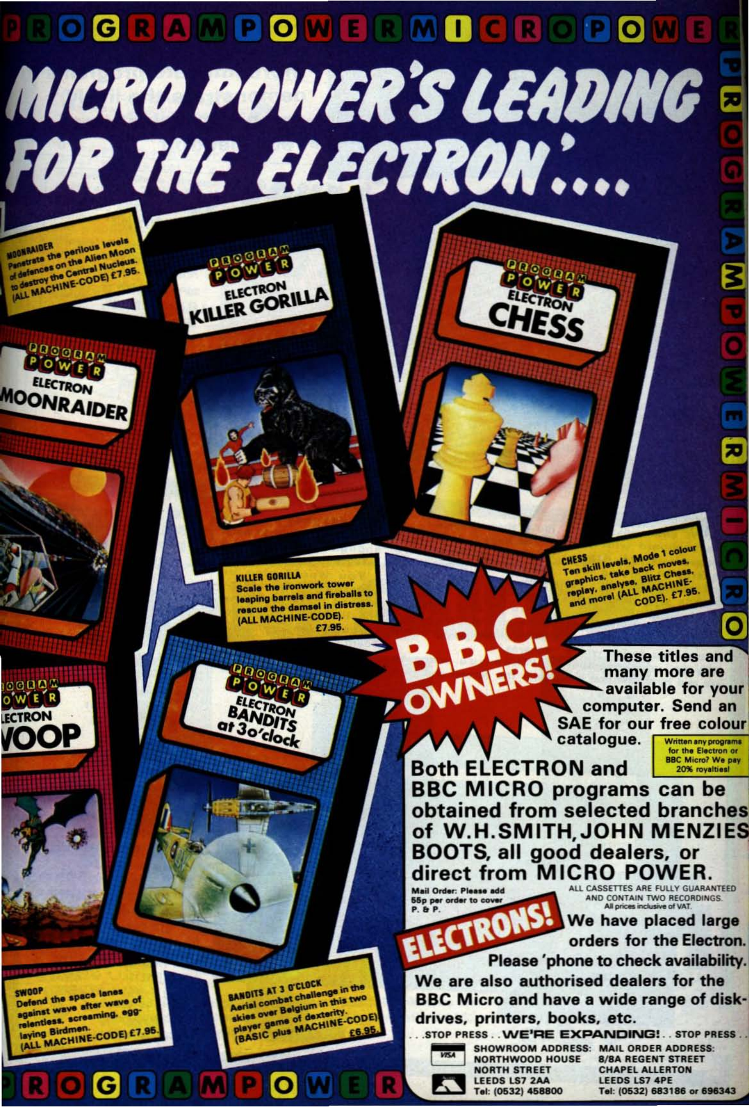
CROAKER
Dodge between the fast-moving traffic then leap from log to log to cross the treacherous river. (ALL MACHINE-CODE) £7.95.

FELIX AND THE FRUIT MONSTERS
Lay ether pools and trigger the magnetic pad to protect the precious fruit from the marauding monsters. (ALL MACHINE-CODE). £7.95.

FELIX IN THE FACTORY
Pitchfork the Gremlins and poison the Giant Rat in your search for the oil to top up the Generator. (ALL MACHINE-CODE). £7.95.

DRAW
A menu-driven turtle graphics language which is both powerful and easy to use. Complete with 22 page manual. (BASIC). £9.95.

ESCAPE FROM MOONBASE ALPHA
Science fiction and fantasy combined in this 3-D graphic adventure set deep in the heart of the nightmare planet. (BASIC plus MACHINE-CODE) £7.95.


PROGRAMPOWERMICROPOWER
PROGRAM POWER
ELECTRON
MOONRAIDER
PROGRAM POWER
ELECTRON
KILLER GORILLA
PROGRAM POWER
ELECTRON
CHESS
PROGRAM POWER
ELECTRON
SWOOP
PROGRAM POWER
ELECTRON
BANDITS
at 3o'clock
PROGRAMPOWER

MICRO POWER'S LEADING FOR THE ELECTRON'....

MOONRAIDER
Penetrate the perilous levels of defences on the Alien Moon to destroy the Central Nucleus. (ALL MACHINE-CODE) £7.95.

KILLER GORILLA
Scale the ironwork tower leaping barrels and fireballs to rescue the damsel in distress. (ALL MACHINE-CODE). £7.95.

CHESS
Ten skill levels, Mode 1 colour graphics, take back moves, replay, analyse, Blitz Chess, and more! (ALL MACHINE-CODE). £7.95.

SWOOP
Defend the space lanes against wave after wave of relentless, screaming, egg-laying Birdmen. (ALL MACHINE-CODE) £7.95.

BANDITS AT 3 O'CLOCK
Aerial combat challenge in the skies over Belgium in this two player game of dexterity. (BASIC plus MACHINE-CODE) £6.95.

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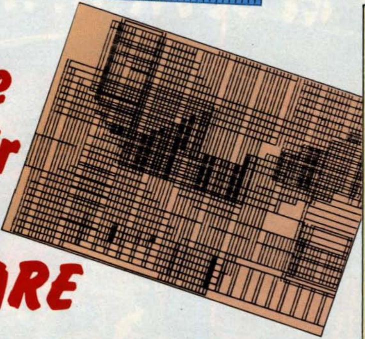
More intricate programs to demonstrate the lively graphics capabilities of your Electron

Make it fair and SQUARE



SHOW your mastery of the keyboard with this program which draws squares of varying size and colour. Amaze your friends with your graphical dexterity!

The program produces a series of squares on the screen. You decide where they go, what size they are and how fast you can move them around.

The keys I, J, L and M are used to manoeuvre the squares, S to shrink them and E to enlarge them.

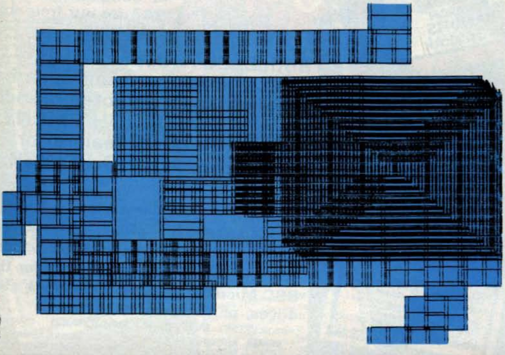
The < and > keys decrease and increase the speed of movement of the squares.

When you want to clear the screen and start again just press the Space bar. And if you ever have enough then press the Break key.

You would also be advised to press the key marked f0 as line 60 of the listing changes the response of your keyboard.

Pressing the f0 key sets things back to rights.

```
 10 REM SQUARES
 20 REM (C)ELECTRON USER
 30 *KEY 0*FX11,60|M
 40 MODE 1
    :VDU 23;8202;0;0;0;
 50 PRINT ''''''"Press C for col
    ours otherwise any key..."
 60 FLA%=(INSTR("NC",
    GET$ )=2)
    :ACC%=5
    :SPE%=20
    :X%=500
    :Y%=500
    :SIZ%=100
    :*FX 11,1
 70 CLS
    :REPEAT
 80 PROCDrawaSquare(X%,Y%)
 90 PROCCheckKeys
100 IF FLA% VDU 19,
    RND(3),RND(15);0;
110 UNTIL FALSE
120 DEF PROCDrawaSquare(X%
    ,Y%)IF FLA% GCOL
    RND(3),RND(3)
130 VDU 29,X%;Y%;
140 MOVE SIZ%,SIZ%
150 DRAW SIZ%,-SIZ%
160 DRAW -SIZ%,-SIZ%
170 DRAW -SIZ%,SIZ%
180 DRAW SIZ%,SIZ%
190 ENDPROC
200 DEF PROCCheckKeys
    :KEY$=INKEY$ (0)
    :*FX 15
210 IF KEY$="I" Y%=Y%+SPE%
    :IF Y%>1023 Y%=0
220 IF KEY$="J" X%=X%-SPE%
    :IF X%<0 X%=1279
230 IF KEY$="M" Y%=Y%-SPE%
    :IF Y%<0 Y%=1023
240 IF KEY$="L" X%=X%+SPE%
    :IF X%>1279 X%=0
250 IF KEY$="E" SIZ%=SIZ%+SPE%
    :IF SIZ%>999 SIZ%=999
260 IF KEY$="S" SIZ%=SIZ%-SPE%
    :IF SIZ%<50 SIZ%=50
270 IF KEY$="." SPE%=SPE%+ACC%
    :IF SPE%>200 SPE%=200
280 IF KEY$="," SPE%=SPE%-ACC%
    :IF SPE%<5 SPE%=5
290 IF KEY$=" " CLS
300 ENDPROC
```

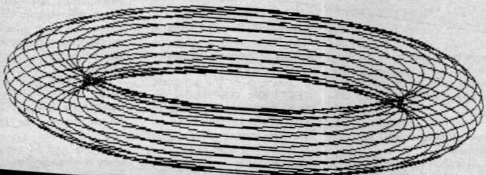


Run rings round your Electron – in 3D

AS you might guess, Iron Ring uses your Electron's graphics to depict a ring on the screen. As it's in Mode 0 you get no colour but what you do get is a marvellours three dimensional effect.

Despite the fact that it appears solid it is actually just a circular series of ellipses drawn over each other, each one slightly offset.

Aren't these micros wonderful?

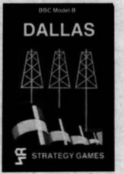


```
 10 REM IRON RING
 20 REM (C)ELECTRON USER
 30 MODE 0
    :VDU 23;8202;0;0;0;
 40 FOR G=0 TO 6.3
    STEP .3
 50 VDU 29.640+SIN (G)*100;
    512+COS (G)*100;
 60 MOVE 0,150
 70 FOR F=0 TO 6.3
    STEP 0.1
 80 DRAW SIN (F)*500,
    COS (F)*150
 90 NEXT
100 NEXT
110 REPEAT UNTIL FALSE
```

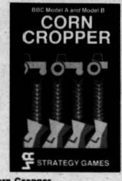
PLANE SAILING

BBC Model A and Model B
AIRLINE
STRATEGY GAMES

Airline
Hijacks, strikes, crashes and spiralling fuel costs must all be overcome if you are to succeed at this game. A wing and a prayer will not be enough to turn your £3 million to £30 million in the time allowed, but your financial wizardry will enable you to take over British Airways, or will it?



Dallas
Can you amass enough petro dollars to take over the Euing empire. Cut throat business and an eye for the main chance may get you there but you'll need nerves of steel to overcome the oil king of Dallas.



Corn Cropper
Limited cash and droughts are two of the problems facing the farmer. Planting, fertilizing and harvesting must all be done economically if you are to reap the rewards offered in Corn Cropper. You choose the method that will bring you success.

BUSINESS STRATEGY GAMES – £6.95

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NOW AVAILABLE ON ELECTRON!

Try this geographical quiz from NORMAN PARR. It also offers techniques you can incorporate into your own programs.

EUROMAP

THIS program draws a map of Europe and then sets up a test situation. It illustrates the use of MOVE and PLOT commands, the drawing of text windows and printing at the graphics cursor.

The majority of the program is taken up by data statements.

These largely contain the X and Y co-ordinates needed to draw the map.

The Electron has a screen divided into 1280 X and 1024 Y co-ordinates and it is necessary to locate each mapping point within these parameters.

If you want to draw a map the first thing to do is to select a map with a suitable scale.

This one was first traced out of an atlas and then a grid, drawn on tracing paper, was placed over it.

Each grid line has to be numbered and it is these numbers that provide the co-ordinates.

In this case the grid was numbered 0 to 220 on the X axis and 40 to 230 on the Y axis.

It is not necessary to plot an excessive number of points but the basic shape of the area must not be lost.

The points used in this program and the grid lines are shown on the now simplified map of Europe. In all there are 441 co-ordinates.

The next step is to set up two arrays to carry the co-ordinates. These are X% and Y% and each is dimensioned at the start of the program.

The data statements are then read into the arrays and at the same time each is multiplied by 4.

The co-ordinates could have been read from the map as the final numbers, but this would have made an already tedious task even more difficult.

The map extremities are now 880 and 920 respectively.

It is then straightforward to use MOVE and PLOT 5 (DRAW) to produce the map.

The only problem is that the map is not a continuous line. Each part of the program is separated into sections, with a MOVE statement shifting the cursor to its new starting point each time. REM statements indicate the appropriate sections.

The rest of the program uses the map to develop a test based on seas. The variable NAME$ is used to hold the names of the water areas.

These are READ out of data at the end of the program. TESTX and TESTY carry the co-ordinates for plotting an asterisk marking the area on the map under examination.

VDU28 is used to set up a text window in which the questions are asked. This area is coloured white with COLOUR 129:CLS in line 500.

As each question is asked the appropriate question number and an asterisk appear on the map.

This is done by using VDU5 which separates the text and graphics cursors, allowing printing to be done at the graphics cursor.

VDU4 must be used immediately afterwards to rejoin the cursors to write inside the text window. A question mark appears on the screen (line 620) prompting an answer.

ANSWER$ is then compared with the relevant NAME$. A simple variable RIGHT counts the success rate.

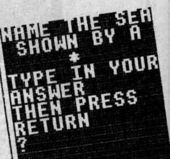
At the end of the test a score is given and the correct answers are printed on the map to check errors.

This printing is again done using VDU5 and 4. Note the extra 60 put on the X co-ordinate to move the name to the right of the asterisk to prevent over-plotting.

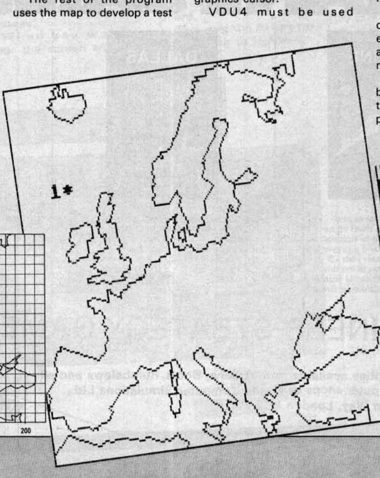
This particular test is obviously very short and only serves to illustrate a technique.

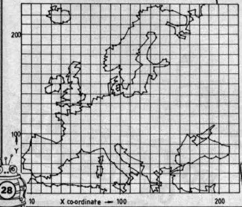
It would be possible to test other aspects of Europe, for example capitals, countries and rivers using similar methods.

A series of such tests could be stored on tape or disc and the chosen test fed in under program control.



```
NAME THE SEA
 SHOWN BY A
     *
TYPE IN YOUR
ANSWER
THEN PRESS
RETURN
?
```





This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

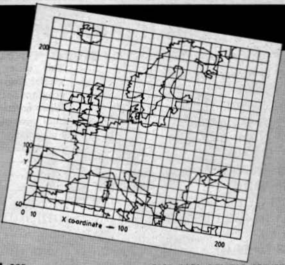
```
 10 REM EUROMAP
 20 REM By Norman Parr
 30 MODE 4
 40 ON ERROR GOTO 810
 50 VDU 23;8202;0;0;0;
 60 DIM X%(441)
   :DIM Y%(441)
   :DIM NAME$(5)
 70 DIM TESTX(5)
   :DIM TESTY(5)
 80 REM *** READ X CO-ORDINAT
   ES ***
 90 FOR I%=1TO 441
   :READ X%(I%)
   :X%(I%)=X%(I%)*4
   :NEXT
100 REM *** READ Y CO-ORDINAT
   ES ***
110 FOR I%=1TO 441
   :READ Y%(I%)
   :Y%(I%)=Y%(I%)*4
   :NEXT
120 REM *** LOOP TO READ
    TEST DATA ***
130 FOR J=1TO 5
140 READ NAME$(J)
150 READ TESTX(J)
   :TESTX(J)=TESTX(J)*4
160 READ TESTY(J)
   :TESTY(J)=TESTY(J)*4
170 NEXT J
180 RIGHT=0
190 REM *** COLOUR 0 TO
    BLUE ***
200 VDU 19,0,4,0,0,0
210 REM *** DRAW MAP FRAME
   ***
220 MOVE 0,160
230 DRAW 0,920
   :DRAW 880,920
   :DRAW 880,160
   :DRAW 0,160
240 REM *** AFRICA ***
250 MOVE 0,45*4
260 FOR I%=1TO 24
270 PLOT 5,X%(I%),Y%(I%)
280 NEXT
290 REM *** MAIN COASTLINE
    ***
300 MOVE 198*4,160
310 FOR I%=25TO 330
   :PLOT 5,X%(I%),Y%(I%)
320 NEXT
330 REM *** SICILY ***
340 MOVE 416,164
   :FOR I%=331TO 340
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
350 REM *** SARDINIA ***
360 MOVE 312,224
   :FOR I%=341TO 348
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
370 REM *** CORSICA ***
380 MOVE 324,276
   :FOR I%=349TO 353
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
390 REM *** SJAELLAND ***
400 MOVE 392,572
   :FOR I%=354TO 359
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
410 REM *** ICELAND ***
420 MOVE 120,856
   :FOR I%=360TO 377
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
430 REM *** UK ***
440 MOVE 236,512
   :FOR I%=378TO 426
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
450 REM *** IRELAND ***
460 MOVE 116,560
   :FOR I%=427TO 441
   :PLOT 5,X%(I%),Y%(I%)
   :NEXT
470 REM *** SET UP TEXT
    WINDOW ***
480 VDU 28,28,20,39,11
490 REM *** COLOUR WINDOW
    WHITE ***
500 COLOUR 129
   :CLS
510 REM *** WRITE IN BLUE
    ***
520 COLOUR 0
530 REM *** TEST ***
540 PRINT "NAME THE SEA SHOWN
    BY A       *"
550 FOR J=1TO 5
560 VDU 5
570 J$=STR$ (J)
580 MOVE TESTX(J),TESTY(J)
   :PRINT J$"*"
590 VDU 4
600 PRINT "TYPE IN YOURANSWER
   "
610 PRINT "THEN PRESS  RETURN
   "
620 INPUT ANSWER$
630 IF ANSWER$=""
   THEN 620
640 IF ANSWER$=NAME$(J)

   THEN RIGHT=RIGHT+1
650 PRINT
660 PROCkey
670 NEXT
680 PRINT "YOUR SCORE =
      "RIGHT;" OUT OF 5"
690 PRINT
700 IF RIGHT=5
   THEN PRINT "WELL DONE!"
710 PROCkey
720 PRINT "CHECK"
730 PRINT "ANSWERS"
740 PRINT
750 FOR I=1TO 5
760 VDU 5
770 MOVE TESTX(I)+60,TESTY(I)
   :PRINT NAME$(I)
780 VDU 4
790 PROCkey
800 NEXT
810 VDU 20
   :VDU 26
   :CLS
820 GOTO 180
830 REM ****X COORDS ********
840 REM *** AFRICA ***
850 DATA 0,10,14,17,21,25
   ,30,31,33,37
860 DATA 40,43,52,54,61
   ,64,68,70,72,75
870 DATA 78,80,84,83
880 REM *** BLACK SEA ***
890 DATA 198,193,188,189
   ,172,173,163
900 DATA 160,154,156,152
   ,158,163,164
910 DATA 170,173,186,193
   ,198,202,209
920 DATA 212,203,201,190
   ,192
930 DATA 191,197,183,178
   ,184,188,182
940 DATA 178,175,173,178
   ,175,172,169
950 DATA 158,160,157,156
   ,163,156,152
960 REM *** GREECE/YUGOSLAVIA
    ***
970 DATA 145,141,143,141
   ,138,135,140
980 DATA 138,142,142,140
   ,140,137,139
990 DATA 137,134,131,138
   ,138,130,127
1000 DATA 123,124,122,122
   ,105,107,102
1010 DATA 100
1020 REM *** ITALY ***
1030 DATA 97,95,95,100,100
   ,103,110,110
1040 DATA 118,117,112,111

   ,113,109,107
1050 DATA 109,107,102,96
   ,93,89,83,73
1060 REM *** S. FRANCE/SPAIN
    ***
1070 DATA 69,63,61,59,56
   ,58,51,48,47,42
1080 DATA 38,40,37,30,29
   ,27,26,24,19,13
1090 DATA 11,9,2,1,3,1,7
   ,9,8,11,13,13,15
1100 DATA 36,41
1110 REM *** FRANCE ***
1120 DATA 41,43,42,44,41
   ,43,41,37,37,34
1130 DATA 34,38,41,47,47
   ,49,49,55,55,61
1140 DATA 60,61,69
1150 REM *** FRANCE - BALTIC
    COAST ***
1160 DATA 68,71,73,75,77
   ,80,82,83,89,88
1170 DATA 90,90,97,94,96
   ,93,91,92,92,95
1180 DATA 95,98,100,102,103
   ,104,107,112
1190 DATA 114,118
1200 REM *** BALTIC/SCANDINAVI
   A ***
1210 DATA 121,123,127,126
   ,127,130,132
1220 DATA 131,134,137,134
   ,135,145,150
1230 DATA 146,146,143,141
   ,134,131,128
1240 DATA 129,136,135,128
   ,127,129,126
1250 DATA 118,119,117,118
   ,116,122,115
1260 DATA 115,112,113,109
   ,107,103,102
```

→

Euromap listing



From Page 29

```
1270 DATA 103,101,99,101
     ,99,99
1280 DATA 97,93,84,83,85
     ,84,84,86,85,86
1290 DATA 85,86,86,90,93
     ,92,96,100,101
1300 DATA 103,109,113,112
     ,118,117,119
1310 DATA 118,122,120,123
     ,127,127,131
1320 DATA 135,138,142,141
     ,143,146,150
1330 DATA 152,168,166,158
     ,149,147,155
1340 DATA 156,158,160,166
     ,166,162,160
1350 DATA 162,165,167,171
     ,170
1360 DATA 167,171,175,171
     ,172,169,177
1370 DATA 177,180,182,182
     ,185
1380 REM ### SICILY ###
1390 DATA 100,94,96,95,97
     ,99,106,104
1400 DATA 107,104
1410 REM ### CORSICA/SARDINIA
     ###
1420 DATA 76,77,76,82,83
     ,81,78,78,79
1430 DATA 80,79,83,81
1440 REM ### SJAELLAND ###
1450 DATA 97,96,96,100,100
     ,97
1460 REM ### ICELAND ###
1470 DATA 29,26,29,28,32
     ,30,35,34,37,37
1480 DATA 39,40,49,50,47
     ,42,40,30
1490 REM ### UK ###
1500 DATA 52,49,45,41,39
     ,36,36,41,48,43
1510 DATA 42,39,42,45,42
     ,43,46,51,50,51
1520 DATA 48,47,48,48,46
     ,49,48,50,52,59
1530 DATA 55,59,55,53,58
     ,58,60,57,58,59
1540 DATA 58,60,62,64,63
     ,59,57,60,59
1550 REM ### IRELAND ###
1560 DATA 26,25,31,28,30
     ,35,36,40,43,43
1570 DATA 39,39,38,34,29
1580 REM ###
1590 REM ###
1600 REM ### Y COORDS ###
1610 DATA 45,54,53,51,50
     ,48,47,48,49,48
1620 DATA 49,49,48,47,48
     ,46,45,46,45,46
1630 DATA 48,45,43,40
1640 DATA 49,46,47,43,45
     ,42,45,44,50,57
1650 DATA 59,63,64,68,71
     ,70,77,75,77,75
1660 DATA 77,87,88,92,95
     ,100,104,108,99
1670 DATA 98,95,95,91,88
     ,93,92,96
1680 DATA 98,95,99,83,78
     ,78,74,68,65,65
1690 REM ### GREECE/YUGOSLAVIA
     ###
1700 DATA 65,63,61,59,62
     ,60,56,53,50
1710 DATA 47,47,46,46,42
     ,43,41,48,49,50
1720 DATA 51,57,59,68,69
     ,71,81,84,85,89
1730 REM ### ITALY ###
1740 DATA 88,87,84,79,76
     ,74,69,68,60,58
1750 DATA 61,58,55,49,50
     ,55,58,62,67,70
1760 DATA 74,85,83
1770 REM ### S. FRANCE/SPAIN
     ###
1780 DATA 81,83,84,82,80
     ,76,74,72,73,68
1790 DATA 65,63,59,57,55
     ,56,55,57,57,56
1800 DATA 58,64,64,70,74
     ,77,83,88,91,97
1810 DATA 97,99,98,90,94
1820 REM ### FRANCE ###
1830 DATA 97,99,103,105,107
     ,110,114,113
1840 DATA 116,117,120,121
     ,120,118,124
1850 DATA 124,122,119,122
     ,124,125,126,127
1860 REM ### FRANCE - BALTIC
     ###
1870 DATA 128,128,134,133
     ,135,135,135
1880 DATA 137,138,150,152
     ,154,157,153
1890 DATA 153,149,144,143
     ,141,141,139
1900 DATA 139,141,140,141
     ,138,137,138
1910 DATA 141,141
1920 REM ### BALTIC/SCANDINAVI
     A ###
1930 DATA 139,142,143,146
     ,150,158,157
1940 DATA 155,154,158,162
     ,168,168,171
1950 DATA 173,175,174,172
     ,169,171,176
1960 DATA 187,197,201,202
     ,198,196,192
1970 DATA 183,182,181,179
     ,174,169,162
1980 DATA 156,154,150,150
     ,145,146,150
1990 DATA 153,156,162,165
     ,167,169
2000 DATA 167,163,163,167
     ,168,170,173
2010 DATA 174,175,177,179
     ,181,184,187
2020 DATA 186,189,189,192
     ,195,196,207
2030 DATA 209,212,216,218
     ,219,222,222
2040 DATA 224,224,224,227
     ,227,229,227
2050 DATA 229,225,223,224
     ,223,224,218
2060 DATA 209,208,212,209
     ,208,200,199
2070 DATA 197,196,197,198
     ,201,202,201
2080 DATA 202,200,203,205
     ,213,215,218
2090 DATA 221,223,224,220
     ,218,219,228
2100 DATA 230
2110 REM ### SICILY ###
2120 DATA 44,48,49,51,51
     ,49,49,45,43,41
2130 REM ### COR/SARD ###
2140 DATA 60,64,68,68,66
     ,58,58,56,72,84
2150 DATA 76,78,69
2160 REM ### SJAELLAND ###
2170 DATA 145,145,148,150
     ,143,145
2180 REM ### ICELAND ###
2190 DATA 217,219,220,223
     ,223,227,229
2200 DATA 224,223,227,227
     ,223,223,217
2210 DATA 213,212,210,214
2220 REM ### UK ###
2230 DATA 128,127,129,128
     ,129,129,131
2240 DATA 132,133,134,136
     ,137,138,141
2250 DATA 141,143,144,145
     ,148,152,151
2260 DATA 154,156,158,157
     ,162,165,169
2270 DATA 173,172,167,166
     ,159,158,157
2280 DATA 151,145,144,142
     ,141,139,138
2290 DATA 139,138,133,132
     ,130,129,128
2300 REM ### IRELAND ###
2310 DATA 141,145,149,151
     ,157,157,158
2320 DATA 159,157,151,150
     ,145,142,142
2330 DATA 140
2340 REM ### TEST DATA ###
2350 DATA ATLANTIC OCEAN
     ,20,180
2360 DATA NORTH SEA,70,150
2370 DATA MEDITERRANEAN SEA
     ,50,60
2380 DATA BALTIC SEA,110
     ,160
2390 DATA BLACK SEA,170,85
2400 DEF PROCkey
2410 PRINT "PRESS ANY"
2420 PRINT "KEY TO"
2430 PRINT "CONTINUE"
2440 A=GET
2450 CLS
2460 ENDPROC
```

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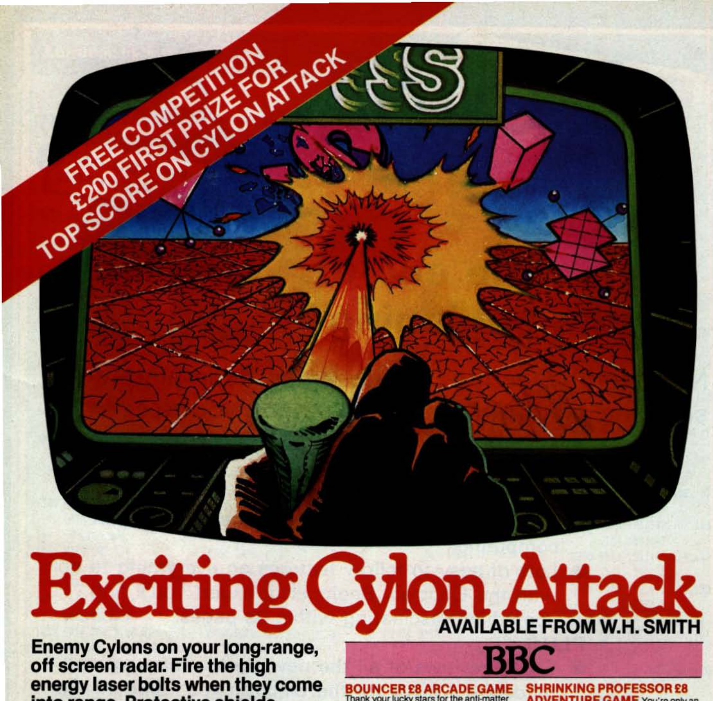

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